The Chemical Age

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Notes and Comments

Group Selling in the Empire

IT is satisfactory to learn from the letters of Mr. Davidson Pratt and Mr. Mortimer, published in our last issue, that the membership of the Association of British Chemical Manufacturers is far more widely representative of the industry than is indicated by the actual number of members. We did not suggest, and we should be the last to do so, that this Association is not admittedly and worthily representative of the industry, but we hinted that it might perhaps be a little obsessed by "Big Business," and be not quite democratic enough to do full justice to the small manufacturer. This impression is not by any means removed by Mr. Davidson Pratt's letter, with its insistence on capital as the basis of importance. As we pointed out before, the great concerns are well able to look after themselves, and it is just the humble "firm of only £10,000 capital" which wants all the help and support it can get. Mr. Davidson Pratt admits that there are a number of firms outside the Association which they would like to have inside it, and we should have liked to hear the reasons which cause these firms to hold aloof. The Association is doing very valuable work, and it is greatly to be desired that every chemical manufacturing concern in the country should belong to it and enjoy the advantages of membership, thereby making the Association completely representative of the whole industry.

The determination of what should properly be included in the chemical group of industries is a difficult question, as Mr. Davidson Pratt points out. Chemical or quasi-chemical processes occur in so many industries that it is hard to know just where to draw the line, but we think it would be unwise to make the classification too narrow. As a good guide we might well take the branches of manufacture dealt with by the Society of Chemical Industry in its publications, which cover a much wider field than that outlined by Mr. Davidson Pratt, yet are quite legitimately considered by the Society as coming within the province of its activities.

A Need for Unification

THERE appears to be a great multiplication of specialised associations within the industry, some of which are affiliated to the A.B.C.M. The arguments in favour of unification of all the chemical and allied societies, which are steadily growing in strength, apply equally strongly to these associations. Why not a greatly enlarged National A.B.C.M. embracing all these associations under one general direction, but with a specialist committee to control each, and plenty of opportunity for exchange of views between the various sections? We venture to think that such an organisation would have many advantages. It should lead to much closer co-operation between the various branches of the industry, and it might very possibly be able to afford to have a permanent collective sales branch in every country to which we export chemicals and chemical plant. Some such bold and far-reaching scheme is necessary if our industry is to have that place in the world's markets to which it is entitled.

Concerning Discovery and Patents

THE new Patents and Designs Act came into operation last week. British patents, it is claimed, will now be placed on a basis as high as that enjoyed by patents of any other country in the world. The major amendment which is made in the Acts of 1907 to 1928, gives the Comptroller discretion to extend the present area of search to any document other than British patent specifications, in which he is of opinion that a possible anticipation may be found. Previously the scope of the search was confined statutorily to the specifications deposited in patent applications made in the United Kingdom within the previous fifty years. Power to extend the search, it is to be noted, is at the discretion of the Comptroller, but the inventor pays an increased fee for the service which is rendered. If this extended search was *compulsory*, so far as the chemical literature is concerned, we do not hesitate to say that better and more valuable chemical patents would be forthcoming. Among such patents as have actually been granted, it is not difficult to find many which have no degree of novelty, taking into consideration the literature already published at the date of application. But that is merely a matter for our amusement in these depressed times. The additional power newly vested in the Comptroller to refuse an application for a patent if the alleged invention is contrary to well-established natural laws is as frivolous as such an application is said to be. It is certainly not within the power of the Comptroller to decide whether or not one of the so-called "natural laws" is actually a thing which cannot be disproved by future research or invention.

Several years back there was actually one and only one hydrogen recognised; to-day, there is ample evidence of the existence of isotopes. Atoms of helium have been produced from other elements long regarded as untransmittible in opposition to the theories advanced by the alchemists of medieval times. Vitamins have been produced from bodies which are entirely different in their constitution, using ultra violet light as a new type of reagent to effect a

rearrangement of the molecule. With greater knowledge of the properties of cosmic rays, neutrons and protons, even the wildest and most fantastic dreams of the inventor may become possible. This is an inventive age when anything might happen. The Comptroller can refuse to accept your application for a patent, but he cannot prevent the making of a discovery which may necessitate the re-writing of chapters in our recognised textbooks and which may prove that all inventors are not fools!

The Birth of a Society

ON the occasion of the presidential address to the Society of Public Analysts in 1925 Dr. Bernard Dyer happened to mention that it was the fiftieth annual address which he had heard delivered to the Society. This casual remark gave rise to a kindly conspiracy to celebrate his personal jubilee in the Society and his association with its administrative affairs by his presence as the guest of honour at a dinner provided by present and surviving past officers and members of the council of the Society. On this occasion Dr. Dyer was tempted to speak of old time incidents and personal recollections connected with the formation of the Society and the earlier years of its progress, and he yielded to the suggestion of the president to write for permanent record a history of the Society during the first fifty years of existence which had then been completed. That is the brief pre-history of the book* which we have before us.

The Society of Public Analysts had an honourable and noteworthy birth. It was in the year 1850 that the editor of "The Lancet" established in connection with that journal an Analytical Sanitary Commission to investigate the question of food adulteration in London and its neighbourhood. Following the startling revelations which were published as a result of the labours of this Commission, a Select Parliamentary Committee was appointed in 1855 and its report resulted in the passing of the first Adulteration Act of 1860. This Act permitted the appointment of analysts by Courts of Quarter Sessions, whilst the same privilege was conferred on the Commissioners of Sewers in the City of London and on the Vestries and District Boards of the Metropolis generally.

The First Meeting

TWELVE years later the Act of 1872 extended the right of appointing analysts to boroughs having separate police establishments, and local officers were authorised to procure samples for analysis. The new Act, however, worked far from smoothly and the general dissatisfaction that arose led to the appointment of another Parliamentary Committee. As the result of this inquiry a report was issued deploring the lack of clear understanding as to what did and what did not constitute adulteration and expressing the opinion that the Act in itself was defective and needed amendment. To consider this report, which also lamented the conflicting decisions and inexperience of analysts, the late Charles Heisch and the late G. W. Wigner, both of whom were well-known London public analysts, called together their London and provincial colleagues who met on August 7, 1874, under the presidency of Dr. Theophilus Redwood, Professor of Chemistry to the Pharmaceutical Society and Public Analyst for Middlesex, when the chief resolution passed was to the effect that "an Association of Public Analysts be formed for the purpose of mutual assistance and co-operation." Details of this historic meeting were recorded in twelve columns of "The Chemical News" for August 14, 1874. The organising Committee which was appointed, with Dr. Redwood as chairman, and Heisch and Wigner as secretaries, then set out upon the task of drawing up a code of rules and drafting definitions of adulteration with suggestions as to limits or standards, following which the first general meeting of the newly-constituted "Society of Public Analysts" took place on February 5, 1875.

Memorable Events

FOLLOWING the progress of the Society through its successive decades, as recorded in Dr. Dyer's book, it is interesting to read of the condition of food analysis in 1875, and of the manner in which food analysis was developed by the Society. Even before the second meeting of the Society took place in May, 1875, the Sale of Food and Drugs Bill was going through its various stages in the House of Commons and the council of the Society was actively pressing for desirable amendments. The Bill was still further amended in its passage through the House of Lords, and on August 11, it received the Royal Assent, thus becoming the Sale of Food and Drugs Act, 1875, under which, supplemented by sundry Amending Acts, the work of the Public Analyst is now continued. Still further on we read of the foundation of "The Analyst," of A. H. Allen's invitation to the Society to meet at Sheffield (1879) when the year was memorable for the appearance of the first volume of the first edition of Allen's "Commercial Organic Analysis." Charles Heisch became president in 1881, and was followed by G. W. Wigner in 1883.

Thereafter, we read of the co-operation of the Society with the Institute of Chemistry, of the qualifications of public analysts, the committee on the Food and Drugs Act (1893) the dinners of the Society, the committee for the determination of butter-fat in margarine (1899), the outbreak of arsenical poisoning (1901), the sale of milk and butter regulations (1901), the analytical investigation scheme (1902), the incorporation of the Society (1906), and the committees which were formed to deal with the acute position which arose in regard to the supply of pure chemical reagents, glass and other apparatus, following upon the outbreak of the war. Finally there comes the standardisation of glassware (1920), and the standardisation of analytical methods (1924-25). Familiar presidential names, and the names of members who died during the term of office of the various presidents, are scattered throughout the pages of this volume of reminiscences, recalling occasions of which our own recollections are as vivid and as pleasurable as those of Dr. Bernard Dyer himself. None the less interesting is that portion of the book by Dr. C. Ainsworth Mitchell, which surveys the activities of the Society and the progress of analytical chemistry during the period 1875-1925.

* "The Society of Public Analysts and other Analytical Chemists: Some Reminiscences of its First Fifty Years," by Bernard Dyer. With a Review of its Activities, by C. Ainsworth Mitchell. Pp. 278. Cambridge: W. Heffer and Sons, Ltd. 12s. 6d.

The Institutes of Chemistry—II

By Professor H. E. ARMSTRONG

"SOMEWHAT arrogant and extreme, perhaps, in his denunciations"—the opinion passed by George Eliot on Savonarola, in the proem to *Romola*—will probably be the criticism passed on me by my friends. The situation is saved by her remark "a *Frate Predicatore* who wanted to move the people: how could he be moderate?" No moderate measures will suffice to bring chemists into line. I cannot believe them to be collectively able to consider what they may best do in their own interests. The craze for so-called research, together with the absence of any proper attempt to digest the old knowledge and give training in methodical thought, has entirely obscured their outlook—this is the bogey that must first be laid.

It is not difficult to go back to the time when chemistry was in the hands of a few men of genius—to the days of Liebig, the first chemical schoolmaster to keep school on any scale. So little was known that the easiest method of approach was to engage directly in pioneering studies, picking up knowledge and developing method by the way. What had been recorded was quickly mastered. I easily read through Liebig's Annalen in the evenings of a single winter in 1868. Hofmann was so trained. Frankland, it is true, was forced to undertake a rigid study of the rudiments in the Lancaster pharmacy, even to the extent of repainting the shop; but in chemistry he was self-trained, and his great achievements were the outcome of innate genius. At least, he learnt to work—not merely from ten to five and without afternoon tea and cigarettes, the present day outward most visible sign of complete inward spiritual thoughtlessness. If chemists were to refrain from burnt offerings and put the money into bricks and mortar, the palace they need might rise, surrounded by the unashed weed, an accomplished fact, within ten or a dozen years. Their continence and foresight would so electrify both themselves and the world outside that they would at once take rank in their own esteem and be deemed worthy of a high place in public affairs.

Test Tube Worship

The early training in chemistry was almost wholly heuristic. As knowledge grew and students increased in numbers, it became necessary to devise a system of keeping them occupied which involved a minimum of effort on the part of, teachers. Mineral analysts, elevated by Berzelius Wöhler and Bunsen into a severe discipline of extraordinary mental and digital value, gradually degenerated into a merely mechanical table and test-tube worship. Most unfortunately, qualitative was set in advance of quantitative analysis. Quantitative work cannot be done by penny-in-the-slot methods. A purely doctrinal routine of study was developed, all going through the same course and learning to think on one set of lines, if at all; in fact, thinking analysts became rare—the species is all but extinct to-day. Mineral chemistry only became systematised and provided with an objective after the periodic law was recognised.

Meanwhile organic chemistry grew apace owing to the wealth of material at hand, the clear-cut nature of the problems awaiting solution and the special interest attaching to the study of vital issues. Wöhler's production of urea, in 1828, by artificial means, was a starting point, though it is probable that the stimulus this gave has been over-rated. Liebig's inspired incursion into the fields of physiology and agriculture was a far more potent cause of advance. Lord Playfair has told us of Liebig's triumphal progress through our country in 1843 and of the hopes inspired in agriculturists. In point of fact, the Royal College of Chemistry, in Oxford Street, was founded in the anticipation that it would promote the development of agricultural science. Unfortunately Hofmann fell in love with aniline and his assistant, Perkin, as a consequence, initiated the manufacture of aniline dyes, thereby greatly increasing the effect of the side blow to agriculture given by the introduction of Free Trade.

To the present day agriculture has made no recovery. Apart from the great discovery of mineral fertilisers, the outcome of Liebig's genius and the late Sir John Lawe's unrivalled practical perspicacity, so-called agricultural research has led to little that is of constructive practical value. It has been either too statistical or too microscopical; although we understand far better what we are doing, we are most lamentably behind in deeper understanding of the physiological problems underlying food production. The general scientific ignorance of the farming class, the lack of imagination and incompetency of the teachers in the schools and colleges, are clear proof of the neglect into which we have allowed matters agricultural to fall. The Royal Agricultural Society does not consider that it is necessary that it should be represented upon the Federal Council of Chemistry. The fact that we are in this position is proof that our teaching is gone agley. At once it may be said that far too much and yet too little is now attempted. The study of "fancies" so fills the bill that solid laboratory training is impossible.

I can go back to 1865. We were then at the end of the period when general physics was taught as a part of chemistry—as exemplified in the first of the three volumes of Miller's Chemistry and also in Cooke's New Chemistry. Atoms were not fully recognised as individual entities and Avogadro's Theorem had yet to be rescued from oblivion by Canizzaro. Kekulé had just nailed his shield carrying the benzene hexagon to the mast of our ship of chemistry. The Frankland-Kekulé dispute over valency was at its height. The periodic law was coming to the fore. There were but few original workers; no large student class was in existence; there was no wet-nursing of incompetency by a plethora of scholarships. The opportunities for chemists in industry were few. Hofmann, who left in 1865, I believe, because he despaired of support, began to flap his wings in Germany in 1868, when the "Berichte" was first issued—the organ of the society established largely at his instigation in imitation of the Chemical Society. The first was a very thin volume; the second nearly thrice its size—I contributed a few pages to its bulk.

The rush came after the 1870 Franco-Prussian war, particularly after Kolbe's discovery of his salicylic acid process (1874) and the development of the Alizarin industry. Students were attracted. The Professoriate soon saw its opportunity. That is to say, the German manufacturers saw theirs, and retained not only the laboratory chiefs but any worker of promise, thereby commercialising and narrowing university education. Here similar action was not taken until after the great war. During five and forty years academic chemistry was little recognised in technical circles. Our chief use was in law suits, but these did not affect laboratory training.

A Disturbing Influence

A new disturbing influence was brought into operation in the later 1880's, due to the introduction of the Arrhenius hypothesis and the establishment of special schools of so-called physical chemistry. A mathematical metaphysical bias came to the fore and a new type of student was attracted into chemistry—on the average, neither fish, flesh, fowl nor good red herring, singularly without any genius for laboratory work. At later dates, special schools of biochemistry and of colloid chemistry were called into being. All these have had a subversive effect on general efficiency; moreover chemists have been broken up into camps, instead of being kept together.

The worst influences has been the degree-hunger and the examination craze, the former fostered since the war by the cry for Research. Our Universities have multiplied degrees, having discovered that in this way even they can make money by research. Formerly, students at our universities took the B.A. at the end of a general course. In Germany, the Ph.D. was the equivalent degree and the thesis was but the continuation of the practice inaugurated by Liebig—the method of learning by doing. The *Arbeit* was supposed to be a piece of work the student had done himself—a proof that he could work alone. No special preliminary test in chemistry was applied until Ostwald and others initiated the *Verbande* Examination, recognising that there was a tendency to neglect preliminary study in analytical chemistry.

Prior to the 1870 war, students were encouraged to work at their own themes. After the war they were taken in hand by their teachers and used to do work likely to be of commercial value; they were often charged to maintain a rigid silence towards their fellow students regarding their work. The German training lost much of its value in consequence: it ceased to be general and unselfish. The late Professor Perkin, in his craze for research—I use the word advisedly—went further than any of his colleagues in securing at Oxford that the Honours Degree should be given only at the close of a fourth year devoted to acquiring a knowledge of the methods of research. This is where the shoe now pinches—where the Chemical Society's difficulty begins. As I have said, in early days the teaching was heuristic from the beginning; then came a time when it became dogmatic and doctrinal; no thought was given to method. We suffer intolerably under this disability to-day.

The Method of Research

The method of research is the method of chemistry, that by which our science has been brought into being—to begin its study when the course of academic training is nearing its close is not merely illogical. Training in method—the meaning of truth—should and, in future, must underly the teaching, from the beginning, whether in school or college. To this end, teachers generally have to recognise the essential difference in meaning of the words *science* and *scientific*. Students are forced to carry a vast, unnecessary, ill-packed burden of knowledge (science); only a few, here and there, by accident, learn to understand how the knowledge has been gained and, therefore, how knowledge may be used and new knowledge acquired. Present day students are largely brought up upon superstitions—creatures of faith, worshippers of fashions. Even the schools teach the last new tips in electrons and neglect oxygen. "Trusting to the solid ground of Nature" 'is a thing of the past. The few, with genius, wearily plot their waf through the morass but much mud is left sticking. The majority never gain sanity and are without outlook. We need to get back to a sound system of laboratory training. The chemist's chief aim should ever be to know his material. We have to develop a solid and truthful—not a fanciful—theoretical substructure to our science. The "bloomin' soul" has to be the main care. Even the headmasters are beginning to see that teachers must be trained. This is fully admitted in Dr. David's recent book, "Life and the Public Schools." Thus far teachers of chemistry have had no training in teaching—few are acting with a conscious purpose beyond that of manufacturing walking text books of undigested and indigestible knowledge. Consequently, the state of our Denmark is nothing short of rotten. The product is mentally in a condition comparable with the bodily condition seamen and famine-starved peoples were in days before scurvey was understood, the factors necessary to the development of intelligence are lacking.

Raise the Level of Intelligence

Discovery and invention have carried the world—have carried chemists—beyond the average level of intelligence. Only by raising the level of intelligence can we recover our position. Chemists do not even realise, do not seek to, the vastness of our own achievements. Having outmatched the rainbow, having taken Nature upon our knees and pulled her to pieces as we have, we are not only justified in claiming to be heard in the councils of the nation, but morally cannot do otherwise than insist on our admission. The world is our oyster to open. We can only gain the needed dexterity and opportunity to use the knife on all occasions if we all co-operate.

The fate of industry is bound up with that of academic science. Eventually industry must not only favour, it must force organisation upon us. Not only as a chemist, as a shareholder and ratepayer, I am inclined to take exception to much of the present expenditure upon research. The sitation is rapidly growing serious, as funds originally voted to serve public ends, to promote the growth and application of scientific inquiry, are more and more being used in promotion of bureaucratic official organisations. Come together we must, without further delay, if only in self-protection.

British Road Tar Association

Sir D. Milne-Watson on the Value of Research

THE annual meeting of the British Road Tar Association was held at the Hotel Metropole, London, on November 2. At a luncheon which preceded the business meeting, Sir David Milne-Watson, president of the Association, reviewed the work of the Association during the past twelve months. They were, he said, engaged upon the task of encouraging and developing the use of British tar on British roads, a matter of concern both to the road engineer and the road user. Again this year they had carried out demonstrations to show what their product could achieve in actual practice on the road, and in addition they had inaugurated a plan of the greatest importance both to themselves and to their customers.

The Association's proposals for co-operative research on road tar having received the sympathetic consideration of the Committee of the Privy Council for Scientific and Industrial Research, a special road tar research committee had been appointed to supervise a general programme of research. This committee consisted of five representatives each of the Association and the Department of Scientific and Industrial Reearch.

The research work was being carried out at the Chemical Research Laboratory, Teddington, under the direction of Professor G. T. Morgan, and the cost was being divided equally between the Department and the Association. The benefits of research were obvious, and a progress report had been received, which indicated that they might look forward through this work to the Association rendering a further service to the road industry of Great Britain.

For the benefit of their own industry, and in a desire to co-operate to the fullest possible extent with those engaged in other countries in the same business they took the initiative in creating an International Road Tar Conference. This Conference was now firmly established, and only a few weeks ago it was his privilege to preside at a plenary session of the conference held in London. The usefulness of this Conference lay in the opportunity it afforded for those engaged in the road tar industry in different countries to exchange views and experiences, and thus encourage action and co-operation for the purpose of promoting the use of road tar in each country.

The keener the competition which they had to meet from other materials of foreign origin, the greater was their incentive to develop and improve their own home materials. Throughout the year they had been unceasing in their efforts to further the use of road tar. Advertisements have appeared regularly to the technuical Press; travelling representatives had called on surveyors and users of tar throughout the country; tar barrel labels, bearing the slogan "Tar Roads Grip" had been extensively used by members; the Association's talking film "Coal Mine to Road" had been used by the district tar boards, who had arranged exhibitions for the mutual benefit of buyers and sellers of tar in their respective areas, and it was also being shown at a minimum of 120 educational centres during the year and the short version "Tar" was being exhibited at a minimum of 300 cinema halls throughout the country.

Surface-dressing experiments had been conducted under the auspices of the Ministry of Transport; experimental work on the surface-treatment of asphalt had been carried out; a demonstration section of tar concrete had been laid in the West Riding of Yorkshire, in co-operation with the county surveyor; the demonstration lengths on the Kingston by-pass continued to give satisfactory service; and the results so far obtained from the Alresford experiment were satisfactory. Much valuable work was also being done in co-operation with the British Standards Institution.

Letters to the Editor

Group Selling in the Empire

SIR,—Mr. J. Davidson Pratt's letter in your issue of November 5 has excited my curiosity and interest in the Association of British Chemical Manufacturers. I am not a member of the Association, but one of the negligible minority of non-members whose " total capital " is not more than 10 per cent. of the total capital represented by members of the Association. Such a statement is highly amusing, if only for the fact that Mr. Pratt regards " capital " as being the dominating factor in his argument, having the good fortune to number the I.C.I. and Lever Brothers amongst members of the A.B.C.M. The aggregate capital of these two concerns alone amounts to about £130,000,000, or 65 per cent. of the capital represented by A.B.C.M. members as a whole (£200,000,000). In other words, considered on the basis of capital, the A.B.C.M. (assuming my figures are correct) is 40 per cent. I.C.I., 25 per cent. Lever Brothers, and 35 per cent. other chemical manufacturing interests.

Making due apology for enlisting the aid of the statistician, we find that if (*according to Mr. Pratt*) the total capital of non-members of the A.B.C.M. is not more than 10 per cent. of the total capital represented by members, it will be a mere £20,000,000 against the vastly greater sum of £70,000,000 representing A.B.C.M. members after I.C.I. and Lever Brothers are excluded. Under these circumstances the A.B.C.M. represents something of the order of 72 per cent. of the industry for which it stands.

Now let us examine this question of " the industry for which it stands." Consulting the 1931 membership list I have been able to count 111 members. (Incidentally, Mr. Pratt tells us that there are 109 members, so are we correct in concluding that the association has lost two members since the 1931 list was prepared?) Among these members there is included the largest British manufacturer of matches; the two largest gas undertakings in this country (which jointly have a total capital of about £33,000,000); a very important manufacturer of artificial silk; one of the largest oil mining and refining companies; a company which extracts nickel from its ores and incidentally works up the rarer metals which are associated with nickel; a firm of petrol distillers; a modern steel works owning a coke oven by-product plant; two salt-producing companies; one manufacturer of starch and laundry blue; six tar distillers (which I admit are very essentially chemical in the true manufacturing sense); a firm of wholesale chemical merchants; and two firms of laboratory furnishers (who, it must be admitted, also make and sell chemicals). Taking this total of 20 members from the grand total of 111, the membership would be reduced to 91, of which thirteen members are subsidiary companies of I.C.I.. Independent and truly chemical manufacturing interests would then be represented by a total of 78 members, or 70 per cent. of the total membership.

Mr. Pratt is quite correct in emphasising the absurdity of comparing members and non-members on a basis of "counting heads," but heaven protect us from making comparisons solely on the basis of capital under such circumstances as exist among members of the A.B.C.M. The only correct basis for comparison is by production and sales statistics, and in regard to this question he is a wise old owl who keeps silent.—Yours faithfully,

" NON-MEMBER."

SIR,—If the Empire sales campaign promulgated by the A.B.C.M. is to be the success which every member of the British chemical industry wishes it to be, the firms " of only £10,000 capital " must be in it, as well as the firms whose capital runs into tens of millions. Mr. Mortimer tells us that the societies affiliated to the A.B.C.M. contain within their membership " almost the whole of the entire trades concerned," whereas Mr. Davidson Pratt frankly discloses that even if the non-A.B.C.M. members in these bodies are taken into account, the total membership is only 470. Cannot either the A.B.C.M. or one of the other societies tell us plainly (1) the number of chemical manufacturing companies in Great Britain, (2) the capital employed by each firm, and (3) the actual number of members of the various organisations, as distinct from the " stage army " figures, in the same way that certain other industries do?

Only when we have this information can any of us know what we are talking about. Neither capital alone nor counting of heads alone can afford a reliable basis for arriving at the real strength of the industry. For the sake of the small manufacturer, whose welfare is just as vitally affected by Empire trade, or the absence of it, as that of the bigger firm, the sales scheme must embrace not merely 90 per cent. of the capital, but 100 per cent. of the entire exporting interests—capital, membership and products—of the industry.—Yours faithfully,

S.C.M.

London.

Society of Public Analysts

Enzymic Activity in Raspberries

AN ordinary meeting of the Society of Public Analysts was held at the rooms of the Chemical Society, Burlington House, London, on November 2, the president, Mr. F. W. F. Arnaud, being in the chair. Certificates were read in favour of Ernest E. U. Abraham, Enid A. M. Bradford, Frank Brookhouse, Gerald H. Edwards, Jack Firth, Albert E. Fletcher, Patrick S. MacMahon, Moses Pulfeles, Edgar A. Raynor, Bernard J. Styles, Viscount Tiverton and Cecil E. Wiseman. The following were elected members of the society: Lionel J. Dent., Leonard A. Haddock, Arthur Littlewood, and John H. Weber.

A paper on changes in raspberries after picking was read by Theodore Rendle, who pointed out that, the ripening process in raspberries is more rapid than in most fruits. Accompanying the ripening there occurs the production of a relatively large amount of volatile organic bodies not due to the action of micro-organisms. The pectic substances in raspberries are subject to rapid change, with the destruction of their gelling power; this change is arrested by the application of heat. It is suggested that the enzymic activity of raspberries is greater than in most British fruits, and is responsible for these phenomena.

The separation of uranium from tantalum, niobium and titanium was dealt with by W. R. Schoeller and H. W. Webb; this work having been done under the Analytical Investigation scheme. Like the earth acids and the earths in general, uranium is quantitatively precipitated by tannin from neutralised tartrate solution in the presence of ammonium acetate and chloride. It is quantitatively precipitated from oxalate solution by tannin and a slight excess of ammonia. Uranium, like zirconium, thorium, aluminium and iron, can be quantitatively separated from tantalum, niobium and titanium by tannin precipitation of the three last-named elements from feebly acid oxalate solution half-saturated with ammonium chloride. In tartaric hydrolysis uranium interferes with the normal course of precipitation in the case of nobium, but not of tantalum or of mixed pent-oxides in which tantalic oxide preponderates.

A new form of filter stick and its use in gravimetric analysis was described by E. J. King. This filter stick is particularly suitable for the micro-analsis of silicic acid. Typical results were cited to show that gravimetric results obtained by this method of filtration are accurate.

A new method for the iodimetric titration of phenols was the subject of a paper by F. J. Warth, in which the author discussed the conditions under which iodine is absorbed by phenols. It was shown that, under certain specified conditions, in the presence of sodium hydroxide two-thirds of the theoretical amounts of iodine are absorbed by phenols, including the cresols.

Industrial Instruments for Plant Control

Means for Enhancing Economy and Efficiency

This article, which is based on information supplied by the Electroflo Meters Co., Ltd., of London, deals with a range of electrically-operated instruments for indicating and recording fluid flow, temperature, draught and percentage of CO_2 in flue gases. It also describes apparatus for the automatic regulation of temperature.

In the majority of industrial works, steam remains the source of power, due to the absence of any universally accepted substitute for steam for process heating. The generation of high pressure steam for motive power, and the utilisation of extraction and exhaust steam for process work, is normal procedure in the widest variety of manufacturing plants. This being so, the provision of the essential steam at the lowest possible cost figure is an important factor in the success of the undertaking.

The road to economy in every sphere of activity is that of maintenance of a continual check on outgoings and income

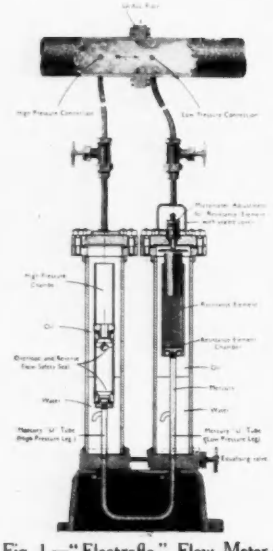

Fig. 1.—"Electroflo" Flow Meter: The Meter Body showing method of operation.

and an accurate accounting for waste, in order that all sources of loss may be eliminated. Meters are therefore playing a most important part in innumerable plants throughout the world measuring continuously steam generation and steam, air, oil and gas utilisation.

Consideration of the value of this equipment is divided between (1) the application of steam and water flow meters, draught, CO_2 and temperature indicators to the boiler plant; and (2) the employment of flow meters on distribution lines to departments and processes. Economy in steam raising, however, is not to be achieved merely through the recording of total evaporation and day to day comparisons, and careful watch over every production stage is imperative. The first requirement is clearly visible indication of total steam demand and individual boiler output, and for these requirements a boiler load indicator is recommended for use on individual boilers. To operate in series with these indicators, recorders and totalisers should be provided, which give individual and total boiler output.

Steam Distribution

The comparison of the figure recorded in the boiler house as total evaporation and that of total steam to factory, provides a day to day check on useful employment which immediately justifies the employment of the necessary meters. The same remarks are true of the measurement of main steam supply to turbines and condensate discharge inasmuch as the ratio of steam consumed to kW generated is the index of turbo-generator efficiency. The maintenance of a similar scrutiny of driving engine and auxiliary plant steam consumption will be amply repaid by this intimation of falling efficiency and its forecast of the need for overhaul. Every step should therefore be taken to maintain a continuous check on the efficiency with which steam is employed by manufacturing departments for process heating, and it will normally be found that very tangible economies can be effected thereby.

The viewpoint for consideration is that steam is one of the most expensive raw materials employed by industry, and should therefore be subject to the restrictions placed on the employment of other raw materials. It is illogical that in many plants before an operative can draw as much as 2 in. of copper strip from the stores, he must be in possession of a duly authorised "requisition," yet the same man can go to a steam valve and use a more expensive raw material just as wastefully as he pleases.

Meters for Fluid Flow

The primary object of metering the production of steam, and the distribution of steam, gas, water, air and oil, is the establishment of fact in place of estimate, and the disclosure of inefficient consumers, whether machines or men. On this basis alone is the search for improved conditions and lower cost properly pursued. When the primary object has been attained, the continuous measurement of flows, temperatures, pressures, CO_2 percentages, etc., provides the only reliable guide for their regulation and the achievement of true economy.

The operating principle of the Electroflo—electrically actuated—flow meter (Fig. 1) is unique. The flow of fluid through a pipe is translated into equivalent electricity, and the problem of accurate fluid flow measurement is reduced to the simplicity of metering an electric lighting and power supply. There are no mechanisms or moving parts, and therefore no friction troubles, or accumulative inaccuracy due to wear of

Fig. 2.—"Electroflo" Flow Meter: A Typical Reading Instrument.

parts. The reading instruments (Fig. 2) are independent of each other and may be located in the best position for observation and use, irrespective of the distance from the measuring point. They include an exclusive 5-figure cyclometer type continous integrator, which has no dependance on the recorder movement, and summates the flow with the accuracy of the watt-hour meter on which it is modelled. Multiple metering systems are also available, offering considerable

advantages to engineers making extensive use of flow meters and other industrial instruments. These instruments avoid the disadvantages of daily clock winding and chart changing, by employing 12 in. wide continuous strip charts, lasting 1,200 hours, and electric clocks. All the required records up to six in number are simultaneously produced in inks of contrasting colours, but the system is so designed that there is no disadvantageous intermingling. The records may be of fluid flow (steam, water, air, oil or gas), temperature, pressure, vacuum and CO_2 percentage, etc., in any required combination and all the measurements are made electrically.

Such a system can be used to show the water fed to the boiler plant, the steam delivered, the exit flue gas temperature, the percentage of CO_2 in the gas, and the steam pressure and temperature; or, the steam delivered by the boilers, and the actual consumption by turbines and related plant,

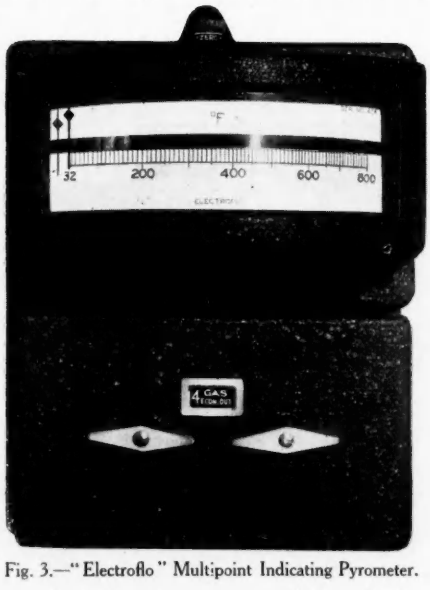

Fig. 3.—"Electroflo" Multipoint Indicating Pyrometer.

and the manufacturing departments. This multiple recorder can be located in the boiler house, the turbine room, or in the works manager's office if desired. It will enable him to note and counteract any unsatisfactory tendency immediately it becomes apparent. If he is temporarily absent for any time the chart will inform him, upon his return, of all occurrences, giving a truthful report. A series of these charts will provide invaluable information respecting periodic or seasonal demands and changes, and will enable repair and general maintenance programmes to be scheduled.

Construction of the Flow Meter

The Electroflo flow meter body (Fig. 1) takes the form of a simple "U" tube, balancing a column of mercury against the differential pressure caused by the flow of fluid through an orifice plate, venturi tube or other differential medium. Pipes of $\frac{3}{8}$ in. bore connect the meter to the upstream and downstream sides of the differential medium. The low pressure leg of the mercury "U" tube contains the resistance element chamber and oil-cooled internal resistance element. When there is a flow in the pipe the downstream pressure becomes lower than the upstream pressure. Accordingly, the mercury level is depressed in the high pressure chamber and raised in the resistance element chamber. As the mercury rises in the resistance element chamber, it forms contact with the internal resistance element, and thus alters the conductance of the electric reading instrument circuit. The resistance element, however, is so formed that the conductance of the circuit is always directly proportional to the flow of fluid in the pipe. The electric reading instruments, while measuring the conductance regulated by the flow, read the rate of flow through the pipe in pounds, gallons or cubic feet per hour.

Upon the movable element of a thermo-electric pyrometer everything else is dependent. The difference between the Electroflo and alternative pyrometer installations will be found chiefly in the type of instrument employed to measure the e.m.f. developed by the thermocouples, which really means the movable element and its method of suspension. It must be borne in mind, however, that despite the improvement in the selection and reproducibility of thermocouples, the e.m.f. developed has remained practically the same. Present-day requirements call for increased accuracy and a more sensitive response to small temperature changes. The essential changes in the design of the pyrometer have therefore had to be confined to the movable element. In this instance, sensitivity must be disassociated from the bogey of delicacy.

To increase the sensitivity of a pyrometer and thus to improve its accuracy and speed of response to temperature changes, it is therefore necessary to develop means whereby full scale deflection is obtained with the minimum proportion of the total e.m.f. developed.

Temperature Indicators

For considerations of convenience and cost, it is often advisable or necessary to measure a number of temperatures on one indicator which is centralised. The Electroflo totally enclosed multipoint indicating pyrometer (Fig. 3) is designed to meet these requirements. It is identical with the single-point instrument, but is provided with one or two multipoint, double-pole, totally enclosed rotary switches. The complete switchbox is hinged, and can be swung outwards in order to give clear access to all connections, and thus permit of the thermocouples being connected up to the respective switch points with the greatest ease. A glazed aperture is provided in the switchbox casing to show the number of thermocouples in circuit with the indicator as the switch is turned. In large manufacuring plant where it is desired to have continuous indication of a series of critical temperatures, continuous multiple temperature indicators can be supplied.

If the requisite standards of operating efficiency are to be maintained, comprehensive temperature measurements throughout the power plant are indispensable. The commonest applications of multipoint indicating pyrometers are therefore in boiler-houses and engine rooms, and the practice is usually to centralise one or more multipoint instruments. The use of individual thermometers at the points of measurement is so inconvenient as to have fallen into almost entire disuse, for such thermometers were apt to be ignored, and since so many of the temperatures are correlated, the time which elapsed between observations at the various points largely nullified the value of the readings. Electroflo pyrometers are used for the measurement of steam, gas, water, oil and air temperatures. The thermocouples or resistance bulbs are connected electrically to a multipoint indicator or, in the case of large units, to an indicator on each boiler and turbine, etc., thus permitting the plant attendant to observe periodically the temperature reached at each point of measurement. From the point of view of supervision, a quick and convenient check is available of the complete series of temperatures, and with a maintained accuracy which can be secured solely with the electrical type of instrument.

Automatic Temperature Control

Manual control based on instrument readings is invariably the acceleration and retardation of the rate of heating or rate of flow as the guiding instrument is inclined to read above or below the pre-determined point, but although manual control may be satisfactory when intelligently and conscientiously exercised, some unforseen event may cause temporary inattention, with a resultant costly effect upon the product, due to the changed conditions. At its best, manual control cannot ensure regulation within the fine limits demanded by many industrial processes and advantageous to all.

The Electroflo system of automatic temperature control is unique in several respects. The base of the system is the high resistance, distance indicating pyrometer previously described. It is fitted with a synchronous motor clock and a special type of contact table and depressor mechanism, with mercury vacuum switch, resulting in a control device as sensitive as the instrument measuring the temperature. The mercury switch eliminates the necessity of contact points opening and closing an electrical circuit during the operation of the control, and the difficulties experienced with alternative

types, viz., arcing and consequent destruction of contacts, are thereby avoided. The system is applied to the control of electric, gas, oil and air heat treatment furnaces, etc.

The Electroflo unit control pyrometer (Fig. 4) is a unique combination of temperature detector, control mechanism and switch, and for the control of electrically-heated furnaces no intervening relay is necessary for circuits up to 50 amperes at 440 volts. The knife-edge method of temperature detection permits an accuracy guarantee of within plus or minus one-half of 1 per cent. at the point of temperature measurement to be given. Where the control pyrometer is applied to the regulation of the temperature of gas, steam or oil-fired processes the instrument is used in conjunction with a reversing motor-operated valve regulator, which automatically controls the fuel valve and slack damper in the case of natural draught furnaces, or the fuel and air valves in tandem in the case of forced draught furnaces or steam valves. A variety of types of valve is available, covering the large majority of industrial applications, and these are fitted with special key screw adjustments permitting the maintenance of any desired fuel-air ratio throughout the range of operation of the control equipment. A complete equipment would also include the Electroflo patented broken thermocouple safety device, a piece of apparatus which ensures the closure of the fuel valve in the event of the deterioration or accidental destruction of the thermocouple employed to detect the furnace temperature. In addition, there would be red and green pilot lamps, showing the opening and closing of the fuel valves or the switching "on" or "off" of the current in the case of electrically-heated furnaces, thus affording visual information to the attendant of the operation of the control equipment.

Combustion and Boiler Efficiency

There are a number of factors which must receive attention when combustion efficiency is considered. Unfortunately, some of these factors are oposed to each other, so that the desired result is the most advantageous compromise. If the

Fig. 4.—"Electroflo" Unit Control Pyrometer.

supply of air is insufficient to completely oxidise the combustible matter, or—with excess air—if the mixing of the air and combustible gases is not thorough, there will be a direct fuel loss. The flue gas will contain carbon monoxide, free hydrogen, various hydrocarbons, and, with low temperatures, possibly free oxygen. On the other hand, if the air supply is excessive the products of combustion will be diluted, and there will be a considerable loss of heat through the chimney with the escaping flue gas. Perfect combustion means the complete oxidation of the combustible matter with the minimum air supply, by which the total potential heat in the fuel is made available for absorption, and the loss of heat through the flue gas is the minimum. It does not follow, however, that perfect combustion signifies high boiler efficiency. On the contrary, the reverse is usually the case.

Regulation of Excess Air

The standard for determining the best percentage of CO_2 for a given set of conditions is the overall efficiency of the boiler as a steam-producing unit, and therefore in the average boiler house the real problem is the regulation of excess air within reasonable limits, and not the minute analysis of the products of combustion. In practice it will be found that the loss through excess air is immeasurably greater than the loss through insufficient air, and usually the presence of CO in the exit gas will be only very occasional. An efficient, accurate and reliable CO_2 recorder is therefore an indispensable item of equipment, in that it gives complete control of the largest of controllable boiler house losses, *viz.*, the loss

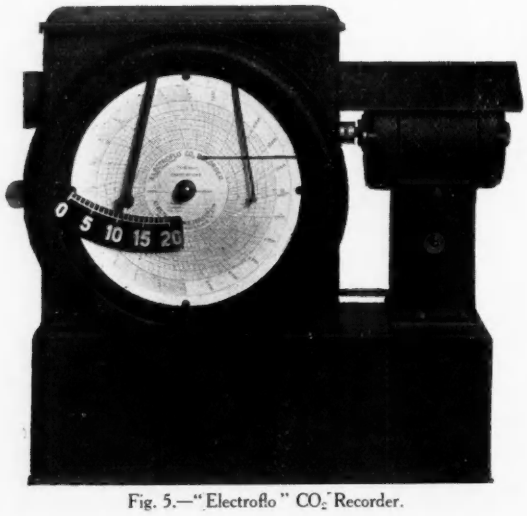

Fig. 5.—"Electroflo" CO_2 Recorder.

through excess air. It simplifies and improves the efficiency of the work of the boiler firemen. Different types of furnace equipment and different fuels require different percentages of excess air in order to ensure satisfactory combustion with good operating efficiency. Analyses of innumerable tests show, however, that in the case of the three major fuels, bituminous and anthracite coals and oil, while the percentage of excess air required varies, the percentage of CO_2 remains remarkably constant, and in the region of 12½ per cent. With pulverised fuel and blast furnace gas it is higher, and with coke oven gas, natural gas, etc., it is lower.

An efficient CO_2 recorder is perhaps the most valuable of boiler house instruments, in that the percentage of CO_2 recorded is a direct index to the degree of efficiency with which fuel has been consumed. The Electroflo motor-driven CO_2 indicator and recorder is wholly independent of water, free from fragile materials, and electrically-driven with all the driving and measuring mechanism continuously oil submerged. It is also offered with an electrical transmitter, to operate a 15 in. diameter indicator, and/or a circular chart or continuous strip chart multipoint recorder at remote positions.

Operation of CO_2 Recorder

The measurement of CO_2 by chemical analysis is the fundamental and accepted standard, against which all other methods must be checked. This is clearly proved by the universal use of the Orsat apparatus for checking CO_2 meters, regardless of their principle of operation. The Electroflo CO_2 recorder (Fig. 5) employs the same principle, but glass tubing, bottles, fragile parts etc., have been entirely eliminated. It measures CO_2 directly and not inferentially, and is therefore independent of such factors as voltage.

humidity, temperature, chimney draught, gas velocity or atmospheric pressure. It provides a continuous ink record of the CO_2 percentage with a degree of accuracy which is comparable only with that of an Orsat.

The pump (A, Fig. 6) draws the gas from the furnace and discharges through tube (B) and pipe (C), which terminate in inlet tube (D). This tube extends through the body of the measuring piston, terminating inside the bottom opening (E) of measuring chamber (F). The opening (E) is always sealed by the oil in the cylinder. The main cylinder is raised and lowered by means of a crank arm and gears driven by the motor. As the cylinder rises and the oil level reaches the end of tube (D) at (E), it traps a definite volume of gas in

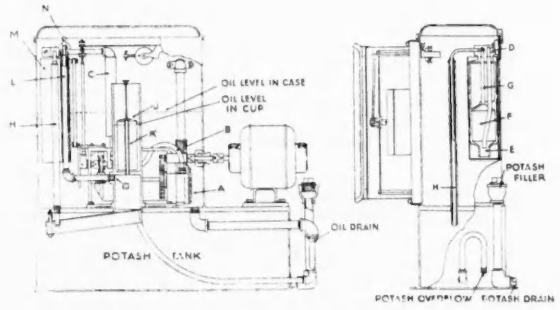

Fig. 6.—"Electroflo" CO_2 Recorder: Diagram showing working mechanism.

chamber (F) inside the piston. As the oil continues to rise, it fills the measuring chamber and forces the contents of this chamber through the tube (G) and extension (H) into the tank containing the potash solution. The gas bubbles through the potash solution under the entire length of the baffle plate and rises to the surface under float (J). This action absorbs all the CO_2 contained in the gas. The residual gas escapes through outlet (K) and raises the float (J) to a height corresponding to its volume. At this time the main cylinder is at its highest position and has driven all the measured gas out of the chamber (F) through the potash and delivered the total residue under the float (J). The arm of the float then takes up the position corresponding to the percentage of CO_2 and consequently causes the pen to take up the correct position on the recorder chart and the pointer on the indicating scale. The cylinder then starts on its downward stroke, thereby releasing the residual gas and drawing in a new charge.

It is important to note that inasmuch as the same oil surrounds the pump, primary and secondary measuring chambers, the gas is kept at the same temperature throughout the process of analysis. Due to the large capacity of the caustic tank, the instrument is capable of operating from four to six months—dependent upon the amount of CO_2 absorbed—before it becomes necessary to drain the tank and refill with fresh potash solution. After the CO_2 has been removed the remaining gases pass up the standpipe and raise the bell an amount inversely proportional to the CO_2 percentage. The percentage of CO_2 in the gases as represented by the final position of the bell, serves for transmitting the reading to distant instruments.

Draught Gauges

Just as the study of combustion demands knowledge of the properties of air, so does the successful practice of combustion demand the employment of legible and sensitive draught and pressure gauges. In their absence, good combustion is impossible of achievement and a serious heat loss through excess air or imperfect combustion results.

Because of the importance of air supply control in boiler houses, and the maintenance of the desirable pressures in gas works, steel works, coking plants, etc., draught and pressure gauges are the most commonplace of industrial instruments, and are available in the widest variety.

A very small change in the reading of a draught gauge indicates a very large air volume change. High accuracy, permanent calibration and great sensitivity are therefore the indispensable qualifications of acceptable draught and pressure gauges. Moreover, if full use is to be made of the instrument's indications it must be possible to read it accurately at a distance. Electroflo draught and pressure gauges (Fig. 7) have dials and charts 12 in. in diameter, and the low range instruments are calibrated in 1/100 in. and 1/10 in. w.g. The design is based on the principle of the U-tube—the primary and fundamental method of measuring suction and pressure in inches w.g.—with the result that the sensitivity and maintained accuracy leave nothing to be desired. In construction these instruments are simple and robust, and they give satisfactory service under the worst industrial conditions.

The freedom from leather, fabric or metal diaphragms (giving trouble through extension, distortion and fracture) will be noted and appreciated. The mechanism is enclosed in a dirt-proof casing, finished in black cellulose enamel. The twenty-four hours clocks run seven days with one winding; they are of the barrel escapement type with interchangeable escapements.

Circular Type Instruments

In the Electroflo circular type draught and pressure indicators and recorders, with a range up to ± 8 inches w.g., the operation of the instrument involves the principles of the sealed bell, the balance and pendulum weight, suitably combined to indicate on a dial (or record on a chart) the pressure or suction in the compartment to which the movement is connected. With the unimportant exception that the bell is sealed with a non-volatile oil, the movement is of metal throughout. The oil employed takes no part in the operation of the instrument and is used merely as an effective seal for the gas bell, and one which introduces no restriction upon the freedom of the movement. The bell is suspended from a beam and extends into the oil seal chamber. The beam is pivoted at the fulcrum and suitably counterbalanced. The draught or pressure is transmitted to the interior of the bell through a small tube and causes the bell to rise or fall, as the pressure or draught changes. This rise or fall is

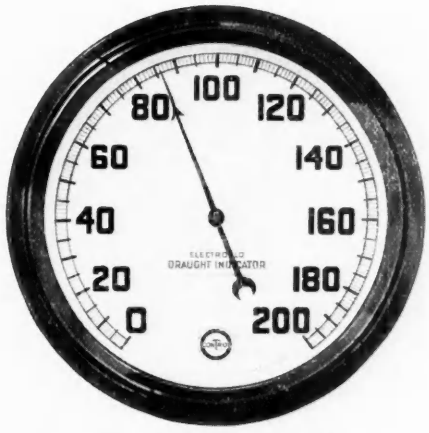

Fig. 7.—"Electroflo" Draught Indicator.

registered on the dial or chart by the indicating arm or pen moving over a suitably calibrated scale. The calibration of this range of instruments is in 1/100 in. or 1/10 in. water gauge—depending upon the range.

In the circular type draught and pressure indicators and recorders which have a range up to ± 100 in. w.g. or its equivalent in inches of mercury, advantage is taken of the mobility of mercury to secure extremely sensitive and rapid measurement of suction or pressure. Here the movement consists essentially of a U-tube, in one of the limbs of which a mercury well is incorporated. A float rides on the surface of the mercury and is suitably connected to the indicator pointer spindle, or recorder pen arm. The float rises and falls with the changes in suction or pressure, its movement being followed exactly by the indicator pointer or recorder pen arm, thus giving a true indication or record of the suction or pressure in the compartment to which the instrument is connected.

The Disposal of Gasworks Liquor Effluents

Second Report of the Liquor Effluents Sub-Committee

THE second report of the Liquor Effluents Sub-Committee of the Institution of Gas Engineers was submitted on the occasion of the Institution's autumn research meeting, which was held in London, November 1-2. This sub-committee, it will be recalled, was appointed in 1926 to investigate the methods which might be adopted for minimising the production of gas liquor effluents or for rendering such effluents suitable for discharge into public sewers or into rivers.

The Measure of Undesirability

The most important effluent from gasworks is spent liquor from the distillation of ammoniacal liquor, but in those cases where the recovery of ammonia has ceased to be practised the ammoniacal liquor itself must be regarded as an effluent. The most obvious way for disposing of a liquid effluent produced in inland towns is by way of the local sewage works, where it is purified to a considerable extent and then is admitted to the natural waterway of the district. The amount of purification required by a works effluent can be regarded as a measure of its undesirability in the sewage. The test most commonly employed to determine this is that of "oxygen absorption," being the parts of oxygen absorbed in four hours at 80° F. by 100,000 parts of liquor from an acid solution of potassium permanganate. Spent liquors from gasworks give values of the order of 500 to 1,000, whilst domestic sewage averages about 10. It does not follow, however, that the relative difficulties of purification of these liquors are proportional to these figures, since the oxygen absorption is only a very rough measure of the amount of oxygen required in the biochemical oxidation which takes place at the sewage works, and it gives no indication of the ease with which this oxidation occurs.

Four types of substances present in spent liquor account for almost all its oxygen absorption from potassium permanganate; these are phenols, higher tar acids, thiosulphates and thiocyanates. The last two are present as calcium salts if the liquor has been limed; otherwise they occur combined with ammonia. In so far as any of these bodies can be removed from, or prevented from occurring in the liquor, the oxygen absorption will be reduced and the liquor improved from the effluent point of view. The sub-committee has therefore given considerable attention to this aspect of the problem and has concentrated more particularly on (*a*) the prevention of higher tar acids from occurring in the ammoniacal liquor and (*b*) the recovery of phenols from ammoniacal liquor. By either of these methods the toxicity of the effluent liquors is decreased.

Higher tar acids occur mainly in liquor from continuous vertical retorts and demand attention not only because of their oxygen absorption, but because they produce strongly coloured compounds on partial oxidation, thus causing discolouration of sewage or stream. The source of these bodies is the tar which condenses with the liquor and it has been found that they can be eliminated almost completely from the liquor by the separation of the tar from the gas whilst above the dew point. An electrostatic tar precipitator was found to be most effective, but good results were also given by a cyclone tar extractor and hot liquor sprays in the foul main. It is, of course, essential that the liquor produced by such methods of operation should not be allowed subsequently to come in contact with the tar. Liquor which is used in the retort house, or which condenses there, will remain rich in higher tar acid and if allowed to mix with the rest of the liquor increases the oxygen absorption of the latter; this should, if possible, be avoided. As far as practicable, therefore, condensation of liquor in the retort house should be prevented.

Removal of Phenols

It is unfortunately the case that the complete elimination of higher tar acids from ammoniacal liquor is accompanied by some increase in the phenol content. Phenols, however, are not so objectionable in liquor as are higher tar acids, since they do not form coloured compounds on atmospheric oxidation and they are more easy to remove from the liquor. Various methods have been proposed for accomplishing this removal, and the one which has met with most favour involves the washing of the liquor with benzole, and the recovery of the phenols from the benzole either by distillation or by washing with caustic soda solution. Several plants of this type have been erected in Germany and in the United States of America, but only one is at present in operation in this country, although at least one other is contemplated. An investigation reported in the first report of the Liquor Effluents and Ammonia Sub-Committee showed that for efficient purification the washer should be of considerable height and the liquor should be heated. It was concluded that the process could not normally be made profitable unless some economical means of recovering the benzole dissolved in the liquor were employed. At Partington, Manchester, active carbon is used for this purpose.

Tricresyl Phosphate as Solvent

Another solvent which is used for the recovery of phenols is tricresyl phosphate, which has advantages over benzole in its low volatility and solubility in water, and in its great capacity for dissolving phenols. For investigations into the use of this substance, the tricresyl phosphate was contained in an experimental washer and ammoniacal liquor at 60° C. was passed through the solvent, samples of the outgoing liquor being taken from time to time. The initial efficiency of the tricresyl phosphate was much greater than that of benzole and its total capacity for phenol was eight times that of the lighter solvent. In addition, thirty times the quantity of higher tar acids was removed. The phenols recovered from the tricresyl phosphate were of better quality than those obtained from benzole, but there is reason to fear that the solvent would deteriorate with continued use, even if vacuum distillation were employed for the recovery of the phenols. The difficulty seems to be that distillation does not recover the higher tar acids, which tend to decompose in the solvent, rendering it more viscous and therefore less suitable for washing purposes.

The committee is indebted to the I. G. Farbenindustrie, of Frankfort, for information concerning the process. Two plants of capacities of 100,000 gal. and 20,000 gal. per day respectively are in operation in Germany. The phenol content of the liquors treated is 3 to 5 gm. per litre and the percentage purification is 92 to 95. The liquor is washed with 8 to 10 per cent. of its volume of solvent, and the amount of the latter which is lost is stated to be 0.08 gm. per litre of liquor, which with tricresyl phosphate at 1s. 6d. per lb. represents 1s. 2d. per 1,000 gal. of liquor. The working temperature is 20 to 30° C. The greatest single factor operating against tricresyl phosphate is the initial cost of solvent.

Use of Tar Oils

Work carried out on tar oils as solvents for purifying ammoniacal liquor is another feature of the appendix to this report. Samples of tars were distilled and the distillates dephenolated and fractionated. Fractions of various boiling ranges were tested and found to be superior to benzole in their solvent power for phenols and higher tar acids. There was no great difference between the fractions; in practice an oil would probably be chosen which is sufficiently lighter than liquor to render separation rapid, and which boils at a higher temperature than phenols, so as to allow of the latter being recovered by distillation. It was found that basic substances were to a large extent the cause of the high solvent capacity of these oils for phenols, for after shaking with acid the distribution coefficients were reduced by approximately half to that of benzole. These basic substances were gradually removed on shaking with water, the solvent thereby deteriorating, but to what extent this would take place with liquor, which itself contains basic substances, is not at present known. Neither is information yet available as to how the solubility of these substances compares with that of benzole, but here again the amount dissolved by ammoniacal liquor would not be so great as that dissolved by water.

The thiocyanate in liquors arises mainly from the reaction of oxygen with ammonium sulphide and cyanide in contact

with liquor. Its formation can therefore be minimised by reducing the quantity of oxygen in the gas or reducing the time of contact of the gas with liquor. It has been shown that when the gas is passed through tower scrubbers where it is in contact with liquor for upwards of three minutes, the amount of thiocyanate formed is very much greater than when the gas is washed in rotary scrubbers where it remains only a few seconds. In the former case the quantity of thiocyanate formed diminished when the oxygen in the gas was reduced. Washing the gas with liquor rather than with water also has the effect of increasing the thiocyanate content of the liquor, and in one or two extreme cases the oxygen absorption due to this substance alone has been over 1,000, instead of the normal 100 to 200, the increase being due almost entirely to prolonged washing of the gas with liquor.

Although the quantity of thiocyanate in an average liquor is considerably less than that of phenol, it may prove to be of equal importance because of the difficulty of its oxidation by bacteria. It has been established that in the bacteria beds at the Coventry gasworks the thiocyanate in the liquor is destroyed to a much smaller extent than is phenol.

The disposal of spent liquor by running it into the sea is practised at most seaside towns, where it is usually mixed with the town sewage. The sea affords dilution much in excess of that required to render the liquor innocuous. Another way of disposal of the liquor is by evaporation, either into the base of chimneys, or on the bars of producers, or in boilers utilising waste heat. These methods are most suitable for devil liquor which leaves no solid residue. The residue from spent liquor may or may not be objectionable, depending on where the evaporation takes place. If the evaporation can be accomplished without the consumption of more fuel than is normally used then the cost of the process is practically zero. At Hinckley, for instance, it was found that 15 gal. per ton of coal carbonised of mixed devil and spent liquor could be evaporated on the bars of the producers by replacing with liquor the water usually used for cooling purposes. To evaporate any liquor in excess of that replacing the water normally supplied would be expensive in fuel unless an abundance of waste heat or coke breeze were available.

Research on the Fermentation of Cellulose

Utilisation of a New Raw Material

Two papers were read at the meeting of the London Section of the Society of Chemical Industry at Burlington House, on Monday, November 7, Dr. Monier-Williams (chairman of the Section) presiding.

The first paper, by H. M. Langwill, of the Distillers Company Research Deparment, gave an account of the work that has been done by that organisation during the past 15 years concerning the fermentation of cellulose. The work was first started at a time when it was being stated that the petroleum oil wells of the world showed signs of exhaustion, the idea then being to produce alcohol but when in the course of time the suggestion as to the petroleum oil wells giving out was proved to be unfounded, the work was transferred to the production of acetic acid. The first experiments were made on peat but this material proved definitely unsuitable and was abandoned as it was found to contain very little cellulose and a considerable quantity of humic matter. Attention was then turned to other typical cellulose materials and the brief results of the work that were given by the author were obtained on dry corn cobs, which are so plentiful in America. Sugar beet pulp was also experimented with. The conclusions drawn from the work were that the fermentation of cellulose is a practical process well suited to large scale production but, on the other hand, the collection of the cellulose raw material presented difficulties which have not yet been overcome. The future of the process depended upon an abundant supply of cheap raw material at the point of manufacture and this was only possible in a few favourably situated places at the present time.

The Chairman said that whilst the process had not been worked out to a practical scale for alcohol, it had been operated on a manufacturing scale in the case of acetic acid. It would be valuable if some information could be given of the micro-organism and how it behaved.

Dr. C. J. Fox said there were vast quantities of cellulosic material available in various parts of the world such as the tow available from sisal and other bass fibre. He had seen vast mounds of cellulosic material which were lying as rubbish heaps literally for miles and it would be a great boon to the producers of this material if they could find a profitable use for it.

Dr. A. Parker asked whether the fermentation in the process dealt with by the author was carried out in batches or was there a gradual withdrawal and addition. He also asked for information as to the optimum proportions of nitrogen, phosphorous and potash, a problem he had been up against in considering the purification of beet sugar waste.

Mr. Langwill, in the course of his reply to the discussion, said he had frequently heard of large quantities of cellulose material being available but when he had made inquiries they seemed to have vanished. Sisal contained a great deal of calcium carbonate, otherwise it was very nearly pure cellulose. He was unable to give any very definite information with regard to the organisms. His own feeling was that there was an organism which brought about hydrolysis and that any organism that happened to be lying around carried on the process from that point. In the ordinary way it was preferred to work the process in batches but when the material became pasty and sticky then it was necessary to empty partly down. As to the optimum proportions of nitrogen, phosphorous and potash, all he could say was that the practice was to put plenty in but he hoped to give more details in the paper as finally printed.

Examination of Asphalt Mixture

A second paper, presented by Professor M. G. Clements, on behalf of Mr. Norman H. Taylor (assistant engineer to the Singapore Municipality), dealt with the examination and testing of asphalt mixture for road pavements. The research described was carried out during the past two years in an endeavour to ascertain the cause of the expansive failure of a large area of paving in Singapore. When signs of incipient failure were noticed, samples were sent to numerous consultants and in due course an almost equal number of reasons were put forward in explanation of the failure. Mr. Taylor then decided to ascertain from a thorough examination of the literature available, and by research, the basic principles of asphalt paving mixture design. This work was commenced in the Department of Highway Engineering at the City and Guilds (Engineering) College, London, and was continued on the author's return to Singapore.

Among the conclusions drawn from this research are that there is a definite tendency for the efficiency of a filler to increase with fineness and that the proportion of a filler that can be added to a sand with continued reduction in voids bears a direct relation to the voids in the filler. It was also noted that the specification of an asphalt mixture of granularmetric analysis and bitumen content is absolutely inadequate. Certain mixtures were tested having identical granularmetric analyses but which, with a given bitumen content, had widely varying voids and stabilities. The stability of mixtures with the same percentage of voids increases with an increase of filler; fillers vary considerably in their stabilising powers, limestone dust being very poor in this respect; whilst limestone dust is remarkably efficient as a void reducer. From this research, the author arrived at the design of a mixture satisfying the requisite conditions for Singapore. If the stone is to act as a framework for the structure and not as an adulterant, it must be present in sufficient quantity to ensure contact between the individual pieces. This quantity varies between 40 per cent. and 60 per cent. The size of the stone is controlled by the thickness of the finished layer and continuity in the structure demands a maximum size of stone of not more than one-third of the finished thickness. The percentage of bitumen was ascertained in the same way as for sheet asphalt mixture, *viz.*, by making trials with increasing proportions of bitumen and noting the effect on voids.

New Technical Books

BRITISH PATENTS AND DESIGNS STATUTES AS AMENDED AND CONSOLIDATED TO 1932. With an Introduction and Index by H. J. W. Bliss, Barrister-at-Law. Pp. 126. Stevens and Sons, Ltd. 4s. 6d.

This book supplies a real need, which is made all the more apparent after any attempt to peruse the Consolidated Acts as published by H.M. Stationery Office. It is prefaced by a few notes on the principal alterations brought about by the 1932 Act. The Amended Acts are fully indexed and the book should find a useful place on the shelves of all legal and patent practitioners, as well as for reference by chemists, engineers, and research workers.

* * *

THE PRINCIPLES OF ORGANIC CHEMISTRY. By James F. Norris. Third Edition. Pp. 595. McGraw-Hill Publishing Co., Ltd. 15s.

This book was originally published as an attempt to emphasise the fundamental principles of the science of organic chemistry, and to describe in some detail the organic compounds of practical importance. In this edition a number of new industrial processes and compounds are included. The chapter on proteins has been revised, a new chapter on alicyclic compounds has been introduced, and the use of thermo-chemical data in simple types of reactions has been extended. In Chapter XVII the method of deducing the structure of a compound from the results of the ultimate analysis of the compound and certain of its derivatives is illustrated by examples.

* * *

TEXTBOOK OF QUANTITATIVE ANALYSIS. By William Thomas Hall. Pp. 279. Chapman and Hall, Ltd. 12s. 6d.

This book represents a course in analytical chemistry as given at the Massachusetts Institute of Technology, being especially adapted to the needs of embryo chemical engineers. The various chapters are devoted to apparatus and units employed in volumetric analysis: the concentration of solutions and volumetric analysis calculations; acidimetry and alkalimetry; oxidation and reduction by (a) potassium dichromate and (b) potassium permanganate; iodimetry; precipitation analyses; gravimetry analysis: the determination of chlorine, iron and sulphur in simple salts; the analysis of limestone, Portland cement, brass, silicates; and the determination of carbon and nickel in steel, sulphur in pyrites, tungsten and titanium in ores. There is also an additional chapter on potentiometric titrations. Various tables of factors are includued as an appendix.

* * *

INDUSTRIAL MICROSCOPY. By Walter Garner. Pp. 389. Sir Isaac Pitman and Sons, Ltd. 21s.

The need for a book dealing generally with microscopy applied to a variety of industrial requirements has been keenly felt by laboratory workers who are called upon to make occasional use of the microscope in the course of their investigations. Details of technique are, of course, scattered throughout the technical literature, but the task of having to consult a dozen or more references in order to become acquainted with one small fact which is in immediate need does not facilitate the progress of the work when some of the references are not easy of access. In many cases the information which is sought ultimately comes to light in the form of a small note which is indexed under some title giving very little clue to the subject matter which it covers. This is particularly the case with microscopical technique, in contrast with analytical technique on a purely chemical basis. Books on the use of the microscope have already been published to meet the requirements of users of the microscope generally or in some particular field, but hitherto one single comprehensive volume has been lacking. The book at present under review deals with "the use of the microscope and the preparation of specimens for all who use the microscope in industry." It covers the chief methods employed in the microscopical examination of raw materials and products, the choice of a suitable microscope and the materials likely to be encountered during experiments. The first four chapters are devoted to technique, microscope accessories, measurement, counting and drawing. Then comes a chapter on photomicrography, followed by others on microchemical technique, inorganic and organic microanalysis, botanical technique, botanical structures, textile and paper-making fibres, insects, microbiological technique, bacteria, fungi, water and sewage. A final chapter is devoted to reagents, 113 formulæ being recorded. Each chapter, moreover, is provided with a bibliography suggesting the direction in which more detailed information may be obtained. The book, as a whole, is written in clear language and should prove very useful to analysts, works chemists, and laboratory workers in many fields of research. It is well illustrated and is strictly confined to the practical aspects of the individual sections.

* * *

INORGANIC CHEMISTRY. By T. Martin Lowry. Second Edition. Pp. 1101. Macmillan and Co., Ltd. 25s.

The first edition of this book was published in 1922. It might have been expected that the intervening period of less than ten years would call for very little revision apart from the insertion of references to recently discovered elements (hafnium and rhenium), the preparation of oxides of fluorine and bromine, the preparation of a "monofluoride" of sulphur, and the increased technical use and greater importance of metals such as beryllium, vanadium and molybdenum. Such a revision would have been a relatively easy task and could have been undertaken without disturbing the pagination of the earlier edition, but since it was necessary to reset the whole of the text, a much more far-reaching process of reconstruction became possible. This reconstruction began with the recognition that formulæ which represent nitrogen as being linked directly by bonds to five other atoms have been proved to be erroneous, and that, for the same reason, the non-polar double bonds of compounds such as thionyl chloride, sulphuryl chloride and phosphoryl chloride, must be replaced by "mixed" or "semi-polar" bonds. Brief references have been inserted to the proton and electron, and to the nucleus atom, and the opportune publication (for the first time since 1914) of an authoritative International Table of Atomic Weights made it possible to introduce the new atomic weights, of which only twenty-five out of eighty have survived unchanged since the last edition of this book. An up-to-date table of isotopes has also been provided, and the physical constants of the elements have been revised with the help of the International Critical Tables. The chapter on the structure of crystals has been re-written from the point at which X-ray analysis enters the field, and has been illustrated with a number of new diagrams. The section on mineral silicates has also been re-written, and the opportunity has been taken of including a series of diagrams to illustrate the rings, chains, networks and cages into which the silicate anions can be shaped. Throughout the book there are many similar improvements. Part I is historical and introductory; Part II deals with non-metals; Part III with metals of the typical series; and Part IV is devoted to non-typical metallic elements.

Books Received

The Extra Pharmacopoeia. Vol. 1. By W. Harrison Martindale. London: H. K. Lewis & Co. Pp. 1,216. 27s. 6d.

Die Industrielle Herstellung von Wasserstoff. By Dr. Heinrich Pincass. Dresden and Leipzig: Theodor Steinkopff. Pp. 82. 6.50 RM.

The Engineering Aspects of the Condensing and Drying of Milk. By A. W. Scott. The Hannah Dairy Research Institute. Bulletin No. 4. Glasgow: Aird & Coghill, Ltd. Pp. 120. 4s. 6d.

British Patents and Designs Statutes as amended and consolidated to 1932. Introduction and Index by H. J. W. Bliss. London: Stevens & Sons, Ltd. Pp. 126. 4s. 6d.

Annuario Statistico dei Prodotti Chimici per l'Agricoltura. Anno. 1931. Vol. II. Rome: Fascist Federation. Pp. 226.

Qualitative Organic Analysis. By Oliver Kamm. London: Chapman & Hall. Pp. 311. 16s. 6d.

The Catalytic Oxidation of Organic Compounds in the Vapor Phase. By L. F. Marek and Dorothy A. Hahn. New York: Chemical Catalog Co. Inc. Pp. 486. $9.00.

Flotation Plant Practice. By Philip Rabone. London: Mining Publications, Ltd. Pp. 141. 10s. 6d.

Incunabula of Tannin Chemistry. By M. Nierenstein. London: Edward Arnold & Co. Pp. 168. 12s. 6d.

Fifty Years of the Society of Public Analysts. By Bernard Dyer and C. Ainsworth Mitchell. Cambridge: W. Heffer & Sons, Ltd. Pp. 278. 12s. 6d.

Alleged Infringement of Artificial Silk Patents

British Celanese, Ltd. v. Courtaulds, Ltd.

THE hearing was continued on November 3, in the Chancery Division, by Mr. Justice Clauson, of the action by British Celanese, Ltd., of Celanese House, Hanover Square, W., against Courtaulds, Ltd., of St. Martins-le-Grand, E.C., for injunctions restraining infringement of four patents related to the production of artificial silk. The opening of the case was reported in THE CHEMICAL AGE last week (p. 438). The plaintiff company alleged that between January, 1926, and July, 1931, the defendant company at its Coventry works made or sold material and used machinery constructed in breach of the patents.

Defendants denied infringement of all the patents and alleged that they were invalid on various grounds, chiefly prior publication and prior common general knowledge. They counter-claimed for revocation of the patents on these grounds.

Sir Arthur Colefax, K.C., Mr. Craig Henderson, K.C., Mr. Neep and Mr. Russell Clarke appeared for plaintiffs, and Mr. Whitehead, K.C., Sir S. Cripps, K.C., Mr. Watson, K.C., and Mr. G. Tookey, for the defendants.

Beautiful Fabrics

Continuing his opening, Sir Arthur dealt with the specification of plaintiffs' second patent, which was for the simultaneous twisting and winding of the product. He pointed out that the manufacturers of to-day used mixtures of acetate silk, viscose silk and cotton in piece goods. It was one of the possible helps to the cotton trade that these beautiful fabrics could be used, but it was to be noted that want of uniformity would show itself in a woven piece. The spinning of cellulose acetate silk had become a vast industry and until the advent of plaintiffs' cap spinning device there had been no such thing as simultaneous twisting and winding continuously of the filament in a dry spinning process.

It was intimated at this stage that the plaintiffs did not persist in their application to amend the specification of the patent for the cap spinning device as in their view it was sufficiently explanatory of the procedure intended.

Mr. Whitehead asked that the motion to amend should be dismissed with costs.

His lordship assented.

On Friday, Sir Arthur announced that he had received instructions to withdraw plaintiffs' claim for infringement of their pump patent, one of the four on which the action was based. That would leave his lordship with defendant's claim for revocation of that patent. His clients still regarded their pump as of great commercial value, and they hoped to maintain the validity of that patent. It was, however, a matter distinct from the art of making artificial silk and it was a pump with special qualities.

Mr. Whitehead said in view of what Sir Arthur had stated they did not propose to persist with the claim for revocation of the pump patent.

Sir Arthur: Then that means that that patent vanishes from the action.

Dry Spun Artificial Silk

Continuing, Sir Arthur summarised plaintiffs' case. He submitted that the three inventions which were left had advanced the art of producing dry spun artificial silk. The first had made possible a considerably higher spinning speed than had been attained before. It also gave greater uniformity of cross section in the product and it enormously economised space and labour as to the output. These special advantages of the sections and co-operation of the several features characterised the process which was the subject of the first patent. It was an invention which was not only unanticipated, but one which marked a real departure in the art.

The second patent made possible simultaneous twisting and winding of the product in the dry spinning process, without any sacrifice to speed in spinning. It also had the advantage of diminishing and in fact avoiding a break of the filaments which was a matter of real importance.

The third patent made possible the production of dry spun artificial silk in a number of associated cells of desired quality and uniformity. There were successive steps and each of them was a distinct invention of great value in the art. They were entirely unanticipated and of undoubted utility. In his submission they were capable of wide application to-day and in each case the patent had been infringed by the defendants.

Mr. JAMES SWINBURNE, F.R.S., the well-known expert, was the first witness called. He described the specifications and said he believed that he was the originator of viscose artificial silk. He suggested about 1900 to Mr. Stearn, the incandescent lamp maker, in partnership with Swan, that they should make filaments of viscose and when he succeeded, witness told him he should make artificial silk. The idea was quite new to him, but he went off and made the silk. He also formed a company, which defendants acquired. Mr. Stearn then dropped making lamps and formed a viscose syndicate, which was taken over by the defendants. Mr. Stearn was going to give witness some shares but unfortunately he died and witness never got them.

Distinctive Properties

Proceeding, witness said the plaintiffs were known in the trade as Celanese and their products had properties of their own quite distinguished from viscose, due to the fact that it was not cellulose, but acetate of cellulose.

Witness was taken through various specifications and said the documents suggested the avoidance of many things and the endeavour to obtain other things that would be of value.

Sir ARTHUR: If the process as accepted in 1920 had been continued for the purpose of making acetate silk, do you think that acetate silk products would have stood up against viscose?—No. Witness said acetate silk had now established itself in the teeth of viscose and had become a valuable artificial silk.

Sir Arthur then took the witness through the alleged anticipations, and witness said the first was away back in 1857 and it disclosed nothing of any use on the subject of the first patent. There was nothing that would be of any use in the manufacture of artificial silk.

In another case witness pointed out that the anticipation alleged related to an invention in which the processes were dealt with by two separate machines.

When the hearing was resumed on Monday, Mr. Swinburne described how artificial silk was spun and said he knew of no dry spinning in which there was simultaneous twisting and winding of filaments as with plaintiffs' cap spinning device. He regarded plaintiff's inventions as useful ones.

Other Actions

Mr. Whitehead, K.C., cross-examined. Mr. Swinburne said he was aware that actions had been brought on these three patents against other defendants. He agreed that one of the three patents was about 13 years old and other two about 10 years old.

Mr. WHITEHEAD: So far as you know it was not until these actions was started a little over a year ago, that any legal complaint was made against such user?—I do not know anything about that.

Witness added that he first began to help plaintiffs less than a year ago.

Mr. WHITEHEAD, dealing with plantiffs' patent for downward and outward spinning, said he supposed he must not call it a down and out patent.

Mr. SWINBURNE agreed that prior to the war cellulose acetate was produced, but it was a curiosity and he did not think it was made commercially.

Mr. WHITEHEAD: Down to the end of the war the non-existence of the cellulose acetate silk industry could not be accounted for?—But during the war the plaintiffs were making cellulose acetate as dope for aeroplanes?—Yes, such experience would be valuable to them, and the plant was valuable for continuing the manufacture of this dope.

Witness admitted that there was a large supply of this new

material for the new purpose of making silk and for other purposes.

Mr. WHITEHEAD: Acetone is a very important material in the manufacture of this acetate silk?—Yes.

Quantities of acetone were wanted during the war for the manufacture of cordite?—Yes.

That is a thread-like substance—squirted substance?—Yes, but it is not squirted but extracted.

Squirted by pressure through an orifice?—Yes.

On Tuesday, Mr. Whitehead further cross-examined Mr. Swinburne on prior specifications. Mr. Whitehead said he would take worsted trade for a moment. In the worsted trade there was the fly spinning and the cap spinning.

Mr. Swinburne had no doubt both were used.

Mr. Whitehead: The flier method of spinning meant that one did not get the same velocity which one could get with the cap spinning?—No.

A Question of Output

Mr. Whitehead: But the cap will rotate more rapidly; therefore spinning more rapidly means that the cap is capable of getting a greater output?—Yes.

And therefore an increase in output is always something that is desired in the textile industry?—Yes.

And not desired any less in the artificial silk industry than in other industries?—No.

And it is used up to 7,000 revolutions a minute in worsted spinning?—I do not know.

You have spoken about the spinning of the continuous thread in the artificial silk industry?—Yes.

There would be a desire to minimise the wastage of spinning thread due to intervals in fitting it again on the spinning machine?—There ought not to be such intervals, but there are. Starting up after a break is important.

Can you point to anything to help the workman overcome the difficulty he meets?—Yes, lubricating again.

Mr. Whitehead next turned to the plaintiffs' specification on cap spinning, and asked witness if it was his view that cap spinning with a rotating cap was less advantageous than cap spinning with a stationary cap.

Mr. Swinburne answered in the affirmative and added that in his view the spinning device should be outside the casing. Part of the specification dealt with tension, which was an important matter, as also was the lubricating, which governed the tension. Witness, in reply to further questions, said he knew nothing of wetting nitro silk and keeping it wet, of his own knowledge.

Mr. Swinburne, replying to Mr. Whitehead, said that if the plaintiffs' invention was an inventive step in relation to cap spinning and lubrication then nothing in the specification appealed to him as being such a step.

The Dividing Line

Mr. Whitehead: Where would you put the dividing line between artificial silk and artificial horse hair?—When it looks like horse hair and when it looks like silk.

On Wednesday, Mr. Swinburne was further cross-examined.

Mr. Whitehead asked whether he agreed that the people engaged in starting the cellulose acetate industry were acquainted with prior documents on artificial silk production on which the defendants relied as anticipating the plaintiffs' patents.

Mr. Swinburne: That might be.

Mr. Whitehead: They would have those as a basis on which to work?

Mr. Swinburne: If you mean he would read those papers I don't think he would. I think the cellulose expert would probably be acquainted with the viscose practice and he would probably have some knowledge of nitro cellulose practice. Those are the only two he would be likely to know anything about.

Mr. Whitehead: The plaintiffs have hundreds of patents?

Mr. Swinburne: I don't know all the patents.

Referring to an observation by Sir Arthur Colefax, Mr. Whitehead remarked that Sir Arthur would learn that some of the things he had opened had better not have been opened.

Mr. Whitehead next dealt with prior documents and put to the witness, Clark's and Newton's specifications.

Mr. Swinburne did not consider they were anticipatory of plaintiffs' patents.

The hearing is proceeding.

Reorganisation of Cosach

Nitrate Production Cut

A NUMBER of important economies, expected to amount to £70,000 a year, were decided on at the last meeting of the board of directors of Cosach. They include the reduction or suppression of the higher personnel in the United States and in Europe, whose salaries are payable on a gold basis; the concentration of the administration in one office in Santiago; and the use of national coal instead of petrol. These and other measures, in addition, to effecting economies, will utilise, it is estimated, between three and four thousand tons of Chilean coal a year. The reduction of nitrate production, in view of the vast stocks already held in the world was also decided on.

Electrothermic Phosphoric Acid

New Soviet Plant in Operation

THE semi-large-scale industrial plant for the electrothermic production of phosphoric acid, designed and erected by the Soviet Institute for Fertiliser Research, is reported to have been in satisfactory operation for some time, and has successfully produced several tons of acid. The phosphoric acid is obtained from crude Chibinska apatite ore, which contains 22 to 27 per cent. of phosphorus pentoxide. According to the temperature at which the treatment of the ore is effected, concentration of the phosphoric acid produced ranges from 70 to 90 per cent. The acid mist is precipitated electrostatically in a Cottrell apparatus. Hitherto only yellow and red phosphorus have been prepared in Soviet Russia, very small quantities of phosphoric acid being made by the combustion of phosphorus. It is stated that the whole of this plant, which consists of a three-phase electric furnace, condensers, purification towers, etc., has been erected entirely from Russian material.

Air Conditioning in a Brewery

A Modern Installation at Watford

COMPLETELY automatic control of the condition of the air is the characteristic feature of new plant which has just been put into operation in four fermenting rooms at Benskin's breweries at Watford. The installation has a capacity of 28,000 cu. ft. per minute of washed, filtered, and cleaned air, and is designed to give a uniform room temperature of not more than 60° F. with any outside shade temperature up to 80° F., although the four rooms are in two storey, the upper of which is exposed to the sun. Further, the degree of cleaning is such that all the dust in the air is removed, as well as a considerable proportion of the bacteria.

This equipment, which has been designed and installed by Davidson and Co., of Belfast, in association with George Adlam and Sons, of Bristol, consists of an automatically controlled air-conditioning plant, operating in series with an electrically driven ammonia refrigerator, and a circulating pump for the cooled water. Included for the treatment of the air are a steam reheater (for winter use), a water spray washer for cleaning and cooling, an oil filter for final cleansing, a steam reheater (also for winter use), and an electrically driven Sirocco fan. The incoming air, partly fresh and partly recirculated, is warmed (if necessary) by the steam preheater, and then passed to the spray washer. This has a series of special atomisers supplied with high-pressure cold water at the rate of 300 gallons a minute from the refrigerator, and in it the air is cooled and about 98 per cent. of the total suspended impurities removed. The air next passes through the secondary oil filter, which removes the remaining very small amount of impurities, and beyond this is the steam reheater for use in cold weather to give the final correct temperature.

During a recent test the required temperature was maintained in the fermenting rooms when the external temperature was abnormally high, although the refrigerator was not working at full capacity. As soon as the conditioning plant was stopped the room temperature rose 7° F. in 30 minutes.

Institution of Chemical Engineers

Report of the Board of Examiners

At the seventh public examination for the Associate-Membership of the Institution of Chemical Engineers, 1932, seven candidates took the full examination and five candidates were required to answer papers A and B only. Of the candidates submitting themselves for examination, the following satisfied the examiners:—C. L. W. Berglin, T. Davies, A. Dodd, F. W. N. Murphy, J. H. G. Plant and H. K. Suttle.

The method of examination was exactly the same as in 1931, the general arrangement and choice of questions being on the same lines as in previous years. The examiners noticed a further improvement in the quality of the answers to the "home" papers, some of the candidates having submitted schemes of manufacture fully worked out, which must have demanded an immense expenditure of time and labour and which reflect great credit upon them. They have gained the feeling that the standard of work required for this examination is being correctly appreciated and although to complete these "home" papers entails much labour, they believe that not only do such papers form an excellent test of the ability of a candidate to attack chemical engineering problems, but afford valuable exercises to the chemical engineering student at the outset of his career.

Some improvement was noted in certain of the drawings, but it is felt that there is room for still further advance in this respect. A knowledge of the ordinary technique of draughtsmanship should be acquired by candidates and they should be encouraged to prepare their drawings in a properly projected arrangement and to distinguish carefully between a mere hand sketch and a working drawing from which a piece of apparatus could be constructed in the shops. Further improvement is also desirable in the preparation of flow sheets and in the use of these in systematising calculations. It is emphasised that an answer to a question based on empirical knowledge alone is insufficient, and where a development from first principles is demanded, this development will be deemed an all-important factor in the answer.

Royal Medals

Professors R. Robinson and E. Mellanby

The King has approved the following awards this year by the president and council of the Royal Society in respect of the two Royal medals:—A Royal Medal to Professor R. Robinson, F.R.S., for his distinguished work in organic chemistry, and a Royal Medal to Professor E. Mellanby, F.R.S., for his distinguished work on dietary factors, especially in connection with rickets.

The following awards of medals have also been made by the president and council for distinguished work:—The Copley Medal to Dr. G. E. Hale for work on the magnetic field of the sun; the Dumford Medal to Professor R. Willstatter for researches in organic chemistry; the Buchanan Medal to Professor T. Madsen for theoretical and practical work on immunity, especially in relation to diphtheria antitoxin, and the Hughes Medal to Dr. J. Chadwick, F.R.S., for researches on radioactivity.

Professor Robinson was educated at Fulneck School, near Leeds, and the University of Manchester. He was Professor of Organic Chemistry (Pure and Applied) at the University of Sydney, New South Wales, 1912-1915; Heath Harrison Professor of Organic Chemistry, Liverpool, 1915; Professor of Chemistry, St. Andrews, 1921; Professor of Organic Chemistry, Manchester, 1922-1928; Professor of Organic Chemistry, University of London, 1928-1930, and since 1930 he has been Waynflete Professor of Chemistry at Oxford. In 1930 he was awarded the Davy Medal by the Roal Society for his work on the constitution and synthesis of natural products, and for his contributions to the theory of original reactions.

Professor Bellamy is Professor of Pharmacology at Sheffield University, hon. physician to Sheffield Royal Infirmary, and has been a member of the Medical Research Council since 1931. He was educated at Barnard Castle School, Emmanuel College, Cambridge, and St. Thomas's Hospital.

Dyestuff Licences

Applications in October

The following statement relating to applications for licences under the Dyestuffs (Import) Regulation Act, 1920, made during October has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 513, of which 445 were from merchants or importers. To these should be added three cases outstanding on September 30, making a total for the month of 516. These were dealt with as follows:—Granted, 494 (of which 483 were dealt with within seven days of receipt); referred to British makers of similar products, 16 (all of which were dealt with within seven days of receipt); outstanding on October 31, six. Of the total of 516 applications received, 499 (or 97 per cent.) were dealt with within seven days of receipt.

Death of Dr. C. B. Marson

Close of a Promising Career

Dr. Cecil Brittain Marson, the recently appointed head of the Hull Municipal Technical College chemistry department, died on October 26. He was found unconscious in his laboratory, and died before reaching hospital. His death was due to poisoning by potassium cyanide, and at the inquest held at Hull on November 3 an open verdict was returned.

Dr. Marson was apprenticed to the public analyst at Hull, Captain J. Foster, and during the war he was attached to the French Army at Verdun. After the war he received an appointment with the chemical staff of the British Thomson-Houston Co. at Rugby. He resigned that post to take a course in the Department of Coal Gas and Fuel Industries at Leeds University, where he obtained his B.Sc. degree, with first-class honours in fuel and metallurgy. He then obtained his Ph.D., after which he was appointed Gas Research Fellow at Leeds University, and later took up the position of chemist on the staff of the Joint Research Committee of the Institution of Gas Engineers there. After being chief chemist of the Northern Coke Research Committee, he went to Hull. Dr. Marson had gained an international reputation for coke research, and his untimely death cuts short a promising career.

Chemist's High Court Action

Arrears of Salary and Damages

In the King's Bench Division last week, Mr. Justice Acton had before him an action by Mr. Richard Wm. Reynolds Davies, of Ducane Road, Shepherds Bush, a chemist and physicist, against Mr. W. Featherstone Hammond, and Mr. Wm. Shackleton, to recover arrears of salary under an agreement of May, 1929, and damages.

Plaintiff's case was that the agreement was made between him and Submerged Combustion, Ltd., of which Mr. Hammond was the managing director, to employ him as chemist and physicist for seven years with a salary of £400 a year rising to £700 by annual increases. A condition was that in the event of a new company being formed and acquiring the defendant's inventions he was to serve the new company, and that if the new company was not formed the agreement was to be deemed to be between the plaintiff and the defendants. No new company was formed and Submerged Combustion, Ltd., went into liquidation in June, 1931. Plaintiff had not received any salary since March, 1931, although he continued working until August.

The defendants relied on correspondence to be read in conjunction with the agreement for its true construction and said that the plaintiff was solely in the employment of Submerged Combustion, Ltd.

His Lordship decided that the affect of the agreement was that in the event of a new company being formed the agreement had to be read as though it were made between the plaintiff and defendants personally. Plaintiff was entitled to recover arrears of salary and damages for breach of agreement.

Judgment was entered for the plaintiff for £566 and costs.

German Nitrogen Trade

Adverse Business Outlook

ACCORDING to the annual report for the financial year ended June 30, 1932, of the Ruhrchemie A.G. at Stergrade the company's business has not only been affected adversely by the general economic crisis, but also by the severe competition in the nitrogen market. Since about half the sales of the German Nitrogen Syndicate went abroad, it had to fight a hard competitive battle. The Ruhrchemie A.G. competed abroad chiefly with soda-nitre, whilst the chief product, ammonium sulphate, was sold in the home market. There had, however, been hardly any sales of it last autumn owing to the indebtedness of German agriculture. During the current year business prospects hardly appeared more favourable than last year. In spite of an agreement reached between European nitrogen producers and the possibility of another with the Chilean saltpetre producers, the sales of nitrogen could hardly be expected to improve because of the international economic crisis, for international prices, now at such a low level, could only recover slowly.

Motor Fuel from Gasworks

Development of the Belfast Scheme

At the laboratories of the Belfast Corporation gas undertaking three chemists have now perfected the discovery they made fifteen months ago of a creosote oil substitute for petrol. This fuel has been produced for some time by the corporation, and has a ready sale, costing 6d. per gallon. The local omnibus company, having tested this fuel over 400,000 miles of roads, has decided to convert for its use more units of its fleet, and has entered into a contract with the gas undertaking for a five years' supply. The London General Omnibus Co. is carrying out exhaustive tests, and the Salford Corporation is running an experimental vehicle. A North of England concern is producing the fuel for omnibus traffic in the Manchester area. The formula has been broadcast throughout the Empire, and a representaive of the Australian Commonwealth Government, who was sent to Belfast for information, has advised that Government to encourage its manufacture and use. It is claimed that any gas company can manufacture the fuel without an additional plant. Because of its high flash point and non-inflammable qualities the fuel cannot be used for starting up or idling, and this necessitates a reserve tank of petrol; but once the engine is started it automatically switches over to creosote. It is stated, too, that this fuel eliminates knocking.

Rock Wool for Insulation

Establishment of a New Industry in Canada

As an outcome of the trend toward a greater use of insulating material the Dominion Department of Mines at Ottawa foresees the establishment of a rock wool manufacturing industry in Canada. Should this materialise the development of the large deposits of dolomite in the Niagara Peninsula of Ontario would follow. Surveys conducted by the Department disclosed the presence of these self-fluxing, argillaceous deposits and researches indicated their suitability as raw material for the manufacture of rock wool. At present the total requirements of the product are imported.

Rock wool is one of the most effective insulating products on the market. It is made by melting suitable natural rock to a very fluid condition in a cupola furnace, using coke as fuel. The molten material issues from the furnace in a small stream, and is atomised by a blast of steam, which converts it into a mass of fine, pliable, colourless, glassy fibres. These fibres constitute the rock wool of commerce. It is very similar in most respects to slag wool, but is practically free from the deleterious element, sulphur, compounds of which are sometimes found in objectionable quantities in slag wool. The insulating value of rock wool is due to the myriads of tiny air cells entrained with the interlaced fibres. Its field of usefulness for insulating purposes ranges from the lowest industrial temperature up to 1,000° F.

The Forthcoming Achema VII

Exhibition of Chemical Plant and Equipment

THE Seventh Exhibition of Chemical Plant will be held in Cologne, June 1-11, 1933. An interesting and crowded programme of functions has been arranged, full details of which will be found in the prospectus of the exhibition, sent free of charge on application to the management, c/o "Dechema" Seelze, near Hanover. In addition to the display of chemical plant and equipment on the part of individual manufacturers, the organisers of the exhibition themselves are arranging a number of displays providing a comprehensive survey of current developments in the rubber and dry ice industries and in the department of chemical plant welding. Mention may also be made of the numerous scientific and technical addresses which authorities will deliver in the halls of the exhibition. Facilities for the projection of demonstration films on the part of the exhibitors will be available, while a comprehensive series of tours to industrial centres in the neighbourhood of Cologne has been organised.

Stainless Steel Dyeing Equipment

Avoiding Colour Changes in Delicate Shades

EXTENSIVE tests carried out in the United States have recently shown that 18-8 chrome-nickel steel is by far the best material for dyeing equipment. These investigations proved that this type of stainless steel is not affected by the solutions commonly used in dyeing operations and that it does not alter the shade of dyes with which it comes into contact. The ease with which stainless steel vats can be cleaned when a colour change is desired is one of their greatest advantages. This is especially important as the demand for innumerable delicate shades requires equipment that can readily and quickly handle one colour after another. Instead of the lengthy boiling-out operations formerly required, it is possible to clean a stainless steel vat thoroughly by rinsing it out with a stream of water from a hose. So great is the reduction in time for changing colours, that in some establishments single stainless steel vats have replaced ten or more wooden vats. Information on this comparatively recent application of stainless steel has been published in a folder entitled, "'Use of Stainless Steel in the Dyeing Industry," issued by Electric Metallurgical Co., of 30 East 42nd Street, New York.

Extraction of Vegetable Dyes

A New Method of Continental Origin

NO entirely satisfactory method has yet been discovered which combines provision for all the factors in the extraction of the tannin and dyes contained in vegetable matter such as wood, bark, leaves or roots. In the first place the temperature of the liquid in which the vegetable matter is steeped must be under accurate control as many substances are extremely liable to decompose at too high temperatures. Other bodies are not sensitive to heat and are not soluble at a low temperature. Any extraction apparatus must, consequently, provide for the adjustment of the temperature as required for different substances being handled. The maximum amount of valuable soluble matter should be extracted from the raw material in order that the least possible amount may be wasted in the spent lye. A high degree of concentration is also desirable in order to keep the cost of evaporation to a minimum.

According to the "Manchester Guardian Commercial" a Swiss firm has recently invented a process which, they claim, covers all the favourable factors and produces results which have never heen attained by other methods. Besides obtaining maximum results with regard to the amount of extract obtained and a maximum gain of valuable soluble matter it is claimed that the new method effects an economy of 20 to 25 per cent. in steam, with a similar economy in fuel. Combined with these advantages is an absolute accurate adjustment of temperature and therefore no loss of sensitive substances by over-heating. The inventors state that the new process can be installed at little expense and in many cases batteries used for older methods can be reconstructed for the new system.

News from the Allied Industries

Tanning

THE LIGHT LEATHER TRADE is much busier than it has been for some considerable time. Glazed kid manufacturers are increasing their output. Chrome calf tanners in all parts of the country are busy and some are extending their works to cope with the increased business. Dressers of semi-chrome upper leathers and of lining leathers are experiencing a very busy time. Several are working overtime and others are adding extensions. Motor clothing leather manufacturers cannot cope with the orders. Both water pigment and cellulose finishes are being eagerly bought up.

Safety Glass

IN THE CHANCERY DIVISION, before Mr. Justice Maugham, on November 2, a settlement was announced of an action brought by Triplex Safety Glass Co., Ltd., against Acetex Safety Glass, Ltd. Mr. Lloyd-Jacob, for the plaintiffs, said that the action was brought to restrain infringement of patent, and that part of the settlement was that the defendants should submit to a perpetual injunction. The plaintiffs would grant the defendants certain licences and would waive their claim for delivery up and damages. Mr. Justice Maugham said that, the plaintiffs agreeing to grant the licences set out in the order, there would be judgment by consent for the plaintiffs for a perpetual injunction.

Mineral Oil

NEW CAPITAL IS BEING RAISED by the British Borneo Petroleum Syndicate, Ltd., which will be available to carry out new business and to take advantage of opportunities which may present themselves to extend the operations of the syndicate. Shareholders are offered by way of rights, at par, *i.e.*, 6s. per share, the unissued 333,340 shares of the syndicate, in the proportion of two shares for every three shares held. The new shares will rank in full for any dividend declared for the year ending March 31 next. The syndicate, it is stated, continues to hold a very substantial block of shares in Apex (Trinidad) Oilfields, Ltd. It is also entitled to a royalty on all the oil produced in Brunei by the British Malayan Petroleum Co. (a subsidiary of the Royal Dutch-Shell group), in respect of which an initial payment has been received, and it is anticipated that considerable revenue from this source will accrue to the syndicate. The most interesting new business with which the syndicate is now concerned, however, is the exploration of 54 square miles of territory comprised in the Elm Concession, which was recently obtained from the mining authorities of the State of Brunswick. These operations are being carried on in participation with and under the technical direction of the Anglo-Persian Oil Co., Ltd.; the drilling of the first well is now in progress, and a depth of approximately 1,200 ft. has already been attained.

China Clay

THE QUESTION OF STATE AID for the china clay industry has been received in Cornwall and Devon with marked reservation. The proposal had arisen through a desire to assist the industry rather than so many china clay workers should be thrown out of employment and obliged to draw the dole. No doubt the principle may be a good one but its application would be found to be extremely difficult. If something could be done to stimulate the trade of the world so as to create a larger demand for china clay that would be appreciated. The trade as a whole is wholly allied to the Federation of British Industries and there is no doubt the matter will be discussed. It is not as if the china clay industry was under the control of one authority; then money might be advantageously applied to the unification of power-drying systems, and still greater shipping facilities, to port and rail. Although the new firm of English Clay Lovering and Pochin and Co. have a potential capacity of nearly a million tons per annum there are many small firms to be considered, otherwise the distribution would be likely to prove unfair. There is not the least doubt that the ultimate effect of the recent combine will be that in the course of a few years all the best clay works will be under one central authority. A very great advantage may be derived by a central control organisation to enable them to adapt their prices to the special circumstances of the market.

Pottery

THERE IS GREATER ACTIVITY in the pottery industry than for many months past, short-time showing a great diminution. Many factories which were working only three days a week have orders which will keep them occupied until well into the new year, and there is every probability that next spring will see an appreciable revival in trade. Inquiries from the Dominions are becoming more frequent, for under the Ottawa agreements increased preferences have been given to certain sections of the industry. The demand at the present time is mainly for medium and low-priced ware.

Artificial Silk

MR. ERNEST WALLS, chairman of North British Rayon, Ltd., presiding at the ordinary general meeting held this week, said that of the £50,000 five-year notes offered to shareholders, £20,000 had been taken up, and a further opportunity was to be given to the shareholders to subscribe the balance. Since the company started great technical advances had been made in the industry, and they had kept abreast of these improvements. Theirs was the only large-scale British industry showing important expansion during a year of disastrous depression. The net selling price of rayon had fallen since the company started by 50 per cent., and throughout the world rayon producers had suffered serious loss.

Dyeing

IN THE MANCHESTER CHANCERY COURT this week, the Vice Chancellor (Sir Courthope Wilson, K.C.) had before him two petitions relating to the Elton Cop Dyeing Co., Ltd., whose registered office is at Walshaw Road, Bury. Mr. C. E. R. Abbott appeared for a creditor who had petitioned for a winding-up order; Mr. J. Bennett for the company, who submitted a scheme of arrangement with unsecured creditors; and Mr. P. Ingress Bell for creditors who agreed to the scheme. Mr. Bennett said the scheme proposed a moratorium in respect of unsecured debts for one year, with power to extend the period to five years. Interest at 4 per cent. would be paid if the trading profits were sufficient. The directors might also make payments on account of the principal if the financial position of the company warranted it. The Vice Chancellor sanctioned the scheme, and dismissed the winding-up petition.

SHAREHOLDERS of the United Indigo and Chemical Co., of Manchester, have approved the directors' proposals for a return of capital. The proposals involve the return of 5s. per preference share of 12s. 6d., and of 1s. 4d. per ordinary share of 3s. 4d., requiring a total return of £95,000, and reducing the issued capital to 240,000 5 per cent. cumulative participating preference shares of 7s. 6d. each and 525 ordinary shares of 2s. each, totalling £142,500. The accounts at June 30 last showed investments (at cost less reserve of £3,783) of £63,046, including £58,136 in British Government and colonial stocks, and Corporation loans on mortgage and accrued interest at £80,759.

Employment Contracts Case

British Celanese Appeal Dismissed

IN the Court of Appeal on Tuesday, Lord Justices Scrutton, Greer and Slesser had before them two appeals by the British Celanese, Ltd., against the decisions of Mr. Justice Macnaghten, sitting in the King's Bench Division, awarding £1,450 damages to Mr. Green, a research chemist, of Withington, Manchester, and £670 damages to Mr. H. Marsden, a research chemist, of Leeds, for breach of contract of employment.

Both plaintiffs were employed under agreements for three years and they were given six months' notice in March, 1931. They contended that this notice was not effective because it should have been given according to the agreements in January, 1931. As it was ineffective the agreements remained in force.

The Court of Appeal, after hearing counsel, affirmed the judgment of Mr. Justice Macnaghten, who accepted the plaintiffs' contention and dismissed both appeals.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

CHEMICALS generally in London have been in good steady demand during the current week. Prices continue to show a firmer tendency. The market for coal tar products is unchanged from last week, and most prices are the same as those quoted for previous weeks. There is a pronounced tendency on the Manchester chemical market at the present time to restrict new business to deliveries over short periods ahead and the probability is that this buying policy will now be generally adhered to until after the turn of the year or, at all events, until price changes, if any, are made known. On the whole, however, deliveries into consumption against existing orders keep up to their recent level and with strike menaces in the textile industry now removed for some time there will be no fresh hindrances to business on this account. Meanwhile, alterations in market quotations during the past week have affected only a limited number of products. Business in the Scottish heavy chemical market continues to be steady with an increase of home inquiries. There are no important changes in prices to report.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; tech. 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 10½d. per lb., less 5%. MANCHESTER: 10½d.

ACID, CRESYLIC.—97/99%, 1s. 5d. to 1s. 7d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID, FORMIC.—LONDON: £52 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £20 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £48 5s. to £48 15s. per ton in casks, £52 to £56 in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £50 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—10d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10½d. to 10½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £22 10s. c.o.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £24 10s. at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, power £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 2d. to 3s. 6d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—4d. to 5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £45 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3¾d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r, or ex works.

CREAM OF TARTAR.—LONDON: £4 5s. per cwt.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton. Brown, £1 per ton less. SCOTLAND: White Crystals, £34 to £36 c.i.f. U.K. ports. Brown, £1 per ton less. MANCHESTER: White, £33; Brown, £31.

LEAD NITRATE.—£28 per ton. MANCHESTER: £28.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £18 to £19 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£54 per ton d/d.

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PHENOL.—Small lots, 7d. per lb. in 3-cwt. drums, bulk quantities down to 6½d. per lb., delivery free U.K.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £39 to £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £31 10s. to £32. MANCHESTER: £32.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £37.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d.; B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums £18 15s. in casks. Solid 76/77% £14 10s. in drums 70/72% £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d/ 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

Pharmaceutical and Fine Chemicals

MENTHOL.—A.B.R., recryst. B.P., 19s. 6d. per lb.; synthetic detached crystals, 8s. 6d. to 10s. per lb.; liquid (95 per cent.), 8s. 6d. per lb.

Essential Oils

VANILLIN.—Ex clove oil, 16s. to 18s. per lb.; ex guaiacol, 14s. 3d. to 16s. 3d. per lb., including packing and delivery free U.K.

CLOVE OIL, 90/92% English, 5s. per lb.

PEPPERMINT OIL.—Japanese, 6s. 9d. per lb.; Wayne County, 13s. per lb.

PETITGRAIN OIL.—6s. per lb.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—6½d. to 7d. per lb. Crude, 60's 2% water, 2s. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.

ACID, CRESYLIC.—99/100, 1s. 7d. per gal.; B.P., 1s. 9d. to 1s. 11d.; Refined, 1s. 7d. to 1s. 9d.; Pale, 98%, 1s. 5d. to 1s. 7d.; Dark, 1s. 2d. to 1s. 3d. LONDON: 98/100%, 1s. 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

The prices of other coal tar products remain unchanged from last week.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The following prices are in operation: Export, £4 15s. per ton shipment November and £4 17s. 6d. per ton shipment December, f.o.b. U.K. port in single bags. Home: £5 5s. per ton for delivery up to June 30, 1933, in 6-ton lots to farmers' nearest stations.

NITRATE OF SODA.—The home price is £8 10s. for November and £8 12s. for December, delivered to farmers' nearest stations in 6-ton lots.

NITRO-CHALK.—The home price is £7 5s. per ton for delivery up to June 30, 1933, in 6-ton lots to farmers' nearest stations.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Applications

COMPOSITIONS FOR USE IN DECOLOURISING DYED FABRICS. W. Kritchevsky and H. C. Prutsman. April 20, 1931. 382,618.

PRODUCTION OF MOTOR BENZOL. Barrett Co. July 30, 1930. 382,647.

PURIFICATION OF COMBUSTIBLE GASES FROM HYDROGEN SULPHIDE. G. Szigeth. June 1, 1931. 382,650.

ELECTRIC ARC TREATMENT OF VAPORISED CARBONACEOUS MATERIALS. J. Y. Johnson (*I. G. Farbenindustrie*). Aug. 24, 1931. 382,690.

PROCESS FOR MODIFYING ALUMINIUM AND ALLOYS CONSISTING MAINLY OR PARTLY OF ALUMINIUM WITHOUT ANY ADDED SILICON. A. Pacz. Aug. 23, 1930. 382,691.

RECOVERY OF SULPHUR. H. G. C. Fairweather (*R. F. Bacon*). Aug. 28, 1931. 382,697.

MANUFACTURE AND PRODUCTION OF WETTING, CLEANSING, DISPENSING, AND LIKE AGENTS. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 28, 1931. 382,718.

MANUFACTURE OF ALIPHATIC ANHYDRIDES. H. Dreyfus. July 15, 1931. 382,673.

MANUFACTURE AND PRODUCTION OF CONVERSION PRODUCTS OF RUBBER. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 2, 1931. 382,755.

MANUFACTURE OF COMPLEX METALLIC ORGANIC COMPOUNDS. Chemische Fabrik Vorm. Sandoz. Nov. 10, 1930. 382,759.

PROCESS OF PRODUCING CHROMIUM ALLOYS LOW IN CARBON. T. R. Haglund. Dec. 11, 1931. 382,796.

PROCESS FOR THE MANUFACTURE OF STYRENE AND HOMOLOGUES THEREOF. I. G. Farbenindustrie. Jan. 17, 1931. 382,816.

MANUFACTURE OF VAT-DYESTUFFS OF THE PYRANTHRONE SERIES. I. G. Farbenindustrie. April 17, 1931. 382,877.

MANUFACTURE OF SALTS OF AMINO-ACRIDINE COMPOUNDS. I. G. Farbenindustrie. May 4, 1931. 382,889.

MANUFACTURE OF MAGNESIUM. G. Gire and R. Fouquet. May 21, 1931. 382,899.

MANUFACTURE OF A SULPHONIC ACID OF PIPERIDINE OR OF AN ALKYL HOMOLOGUE OF PIPERIDINE. I. G. Farbenindustrie. June 20, 1931. 382,922.

PRODUCTION OF ALDEHYDES. H. T. Bohme Akt.-Ges. July 15, 1931 382,929.

Complete Specifications open to Public Inspection

METHOD OF RELIEVING WASTE LIQUORS FROM THE SODA OR SULPHATE PULP MANUFACTUR OF SILICA. E. L. Rinman. Oct. 26, 1931. 34442/31.

METHODS OF MAKING PLASTIC ELASTIC MATERIALS. Naugatuck Chemical Co. Oct. 27, 1931. 26728/32.

DISINFECTANTS AND DISINFECTANT DETERGENTS. Henkel and Cie, Ges. Oct. 29, 1931. 27819/32.

PROCESS FOR THE PRODUCTION OF ALKYLATED CYCLO-HEPTANONES AND CYCLO-OCTANONES. Soc. Anon. M. Naef et Cie. Oct. 30, 1931. 27931/32.

PROCESS FOR THE CONVERSION OF KETONES INTO UNSATURATED ALDEHYDES. Soc. Anon. M. Naef et Cie. Oct. 30, 1931. 27932/32.

PROCESS FOR THE PRODUCTION OF CONDENSATION PRODUCTS OF ALKYLATED CYCLO-HEPTENE-ALDEHYDES OR CYCLO-OCTENE-ALDEHYDES WITH ACETONE OR ACETILDEHYDE OR THEIR HOMOLOGUES. Soc. Anon. M. Naef et Cie. Oct. 30, 1931. 27933/32.

PROCESS FOR THE PRODUCTION OF LACTIC ACID. Standard Brands, Inc. Oct. 29, 1931. 29464/32.

MANUFACTURE OF AZO DYESTUFFS. I. G. Farbenindustrie. Oct. 26 1931. 29582/32.

PRINTING COLOURS OF THE INDATHRONE SERIES. E. I. Du Pont de Nemours and Co. Oct. 26, 1931. 29988/32.

MANUFACTURE OF RUBBER CHLORINATION PRODUCTS. I. G. Farbenindustrie. Oct. 27, 1931. 29996/32.

MANUFACTURE OF RESINS AND LIKE PLASTIC SUBSTANCES. Standard Oil Development C. Oct. 30, 1931. 30284/32.

TREATMENT OF BENZINE OR GASOLINE. Hanseatische Muhlenwerke Akt.-Ges. Oct. 28, 1931. 30317/32.

MANUFACTURE OF PHOSPHORIC ACID. C. Urbain (née Leroy) and S. Urbain. Oct. 29, 1931. 30325/32.

MANUFACTURE OF CEMENT POWDERS. I. G. Farbenindustrie. Oct. 29, 1931. 30542/32.

Applications for Patents

HALOGENATION OF SATURATED HYDROCARBONS. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 29. (United States, Nov. 11, '31.) 30405.

INHIBITION OF SUBSTITUTION REACTION. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 29. (United States, Nov. 11, '31.) 30406.

PRODUCTION OF PURIFYING AGENTS, ETC. Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury and Van der Lande, aend J. E. Pollak. Oct. 26. 30035.

PRODUCTION OF FERTILISERS. J. E. Pollak (*Hoesch-Köln Neuessen Akt.-Ges. für Bergbau und Huttenbetrieb*). Oct. 26. 30034.

MANUFACTURE OF THIOUREA. Soc. of Chemical Industry in Basle. Oct. 26. (Switzerland, Jan. 27.) 30019.

MANUFACTURE OF ACETYLENE, ETC. Standard Oil Development Co. Oct. 28. (United States, Nov. 25, '31.) 30283.

MANUFACTURE OF RESINS, ETC. Standard Oil Development Co. Oct. 28. (United States, Oct. 30, '31.) 30284.

PAPER, AND METHODS OF MAKING SAME. Titanium Pigment Co., Inc. Oct. 28. (United States, Oct. 31, '31.) 30319.

MANUFACTURE OF PHOSPHORIC ACID. C. Urbain (née Leroy). Oct. 28 (France, Oct. 29, '31.) 30325.

PRODUCTION OF SYNTHETIC RESINS. Dr. K. Albert Ges. Chemische Fabriken. Nov. 3. (Germany, Nov. 7, '31.) 31029, and Nov. 3 (Germany, Aug. 16). 31030. (Cognate with 31029.)

FIRING CERAMIC WARE. J. T. Bamford. Nov. 5. 31226.

MANUFACTURE OF COPPER. British Copper Refiners, Ltd., and F. J. Brislee. Nov. 4. 31125.

PRODUCTION OF ZINC WHITE. H. E. Coley. Nov. 4. 31177.

PREPARATION OF OXIDE OF BERYLLIUM. Compagnie de Produits Chimiques et Electrométallurgiques Alais, Froges, et Camargue. Oct. 31. (France, Nov. 28, '31.) 30532.

AUTOMATIC APPARATUS IMPROVING THE PROCESS OF ANTISEPTICS BY ELECTROLYSIS. R. Desplat. Nov. 5. 31288.

PREPARATION OF CATALYSTS. Distillers Co., Ltd., and H. M. Stanley. Nov. 3. 31000.

COATING COMPOSITIONS. E. I. Du Pont de Nemours and Co. Nov. 1. 30803.

COATING COMPOSITIONS. E. I. Du Pont de Nemours and Co. Oct. 31. (United States, Nov. 6, '31.) 30512.

MERCURY ARC RECTIFIERS. E. Gallizia. Nov. 2. 30884.

PRODUCTION OF RUST-PROOF IRON, ETC. W. Germann. Oct. 31. 30576.

TREATMENT OF FATTY SUBSTANCES. T. Gross. Nov. 2. 30899.

MANUFACTURE OF 1-PHENYL-2-AMINO-PROPAN-1-OLS. W. W. Groves and I. G. Farbenindustrie. Oct. 31. 30539.

From Week to Week

MR. JOHN MATHER has been appointed secretary of Joseph Crosfield and Sons, Ltd.

AN OUTBREAK OF FIRE occurred in the water gas plant of Imperial Chemical Industries, Ltd., Billingham, on November 2. After two hours' work the fire was put out. No damage was done to the plant.

THE LARGEST NITRATE PLANT in the world, at Pedro de Valdivia, in Chile, which has a capacity of 700,000 tons a year, suspended work on November 5. The suspension is described as a "constructive move."

MR. WALTER STUNZI, president of the Stunzi Sous Silk Co., and Mr. David Thomas, of C. K. Eagle and Co., have been appointed to serve on the Silk Committee of the Textile Colour Card Association of the United States.

THE UNIVERSITY OF BOMBAY has donated Rs.5½ lahks (£41,250) for the starting of a technological institute for the study of textile chemistry. This institute, which will be opened at an early date, will greatly assist the textile industry of Bombay.

IN THE COMPANIES COURT on Monday, Mr. Justice Bennett made an order for the compulsory winding up of Rayon Manufacturing Co. (1927), Ltd., on the petition of the London and Home Counties Electricity Authority. Mr. Lindon, who appeared for the petitioners, said they were creditors for £4,000 for electricity, and they received a post-dated cheque for £2,000 which had been dishonoured. There were creditors supporting the petition and the respondents did not appear.

THE STANDING COMMITTEE appointed by the Board of Trade under the Merchandise Marks Act, will hold an inquiry at 11.30 a.m. on Monday, November 28, and, if necessary, at 10.30 a.m. on Tuesday, November 29, as to whether imported wood wool and wood wool rope should be required to bear an indication of origin. The inquiry will be held at the Board of Trade Offices, Great George Street, London, S.W.1. Communications should be addressed to the Secretary, Mr. E. W. Reardon, at that address.

CONDEMNING POLITICAL INTERFERENCE IN INDUSTRY, Lord Melchett proposes to move, in the House of Lords, a bill to set up an economic executive chamber of experts carefully chosen to re-plan the economic life of the nation. His view is that the world has to move into an entirely new economic era, and that Parliament, as at present constituted, is not selected on such a basis as to be likely to have that intimate knowledge of the problems of industry, science, commerce and agriculture, which is essential for the execution of the necessary economic reforms.

THE EXTRACTION OF PETROL FROM COAL has been carried out on a small scale for some months by Imperial Chemical Industries, Ltd., at Billingham. Although the firm successfully produced petrol from coal some time ago, it was said that the experiment could not be carried out on a commercial basis. It is reported that this difficulty has now been overcome and that the present experimental plant at Billingham is to be enlarged to deal with larger quantities of spirit. Imperial Chemical Industries, Ltd., has been running its road transport vehicles for some time on synthetic spirit, and the use of Durham coal for this purpose has been found satisfactory.

SIR FRANK E. SMITH, Secretary of the Department of Scientific and Industrial Research, will give the eighth annual Norman Lockyer Lecture of the British Science Guild in the Goldsmiths' Hall, Foster Lane, London, E.C.2 (by permission of the Worshipful Company of Goldsmiths) on November 22, at 4.30 p.m., when the president of the Guild, Sir Samuel Hoare, will take the chair. The lecture will be entitled "Industrial Research and the Nation's Balance Sheet." Admission tickets, for which there is no charge, may be obtained on application to the Secretary, the British Science Guild, 6 John Street, Adelphi, London, W.C.2.

BY THE COURTESY of Alfred Herbert, Ltd., of Coventry, the next meeting of the Society of Glass Technology will take place at the works of that company on November 16. The programme arranged includes a tour of the works where machine tools of various kinds will be seen in the process of manufacture, and there will be in operation an installation of machinery suitable for making moulds for glass bottles and pressed ware. Those proposing to take part in the visit to Coventry should advise the hon. secretary not later than November 14. The visit will be a joint one with the Glass Manufacturers' Federation.

IN THE CHANCERY DIVISION on Monday, Mr. Justice Bennett, sitting in the Companies Court, had before him a petition for the compulsory winding up of Atlas Artificial Silk Processes, Ltd. The petition was by R. Barron-Sicree, of Cross Street, Manchester. Mr. Slade, for the petitioner, said he was a creditor of the company for £116. Mr. Beeber appeared for the company and opposing creditors for £1,300, and he asked for an adjournment as negotiations were on foot with a view to a scheme of arrangement. His lordship: I understand that you have had one scheme. Mr. Slade: One term of the scheme was that the petitioner' costs should be paid and that has not been done. Mr. Romer said he appeared for a creditor for £80 odd. His lordship adjourned the petition for a week.

MR. BALDWIN will open the new National Physical Laboratory tank at Teddington on Friday, November 18.

WORK HAS BEEN RESUMED by eight of the nitrate undertakings which operate independent of the Chilean nitrate combine.

MR. B. H. BINDER has been elected a director of the India Rubber, Gutta Percha, and Telegraph Works Co., and assumes the position of chairman rendered vacant by the death of the late Sir John Ferguson.

AT A GENERAL MEETING of the members of the Royal Institution held on November 7 with Sir Robert Robertson, treasurer and vice-president, in the chair, Mr. J. Calvert Spensley, Professor F. Craven Moore, Mr. Otto Langer and Mr. J.D.Hindley-Smith were elected members.

SINCE AUGUST 1, 1931, when the present zinc cartel came into being, the stocks in the hands of the members of the cartel have been reduced from 206,405 tons to 154,614 tons, representing about 25 cent. The last three months show a total reduction of 13,163 tons.

THE INSTITUTION OF CHEMICAL ENGINEERS announces that application forms and particulars of the associate-membership examination for 1932, together with a memorandum on "The Training of a Chemical Engineer," may be obtained from the hon. registrar, Abbey House, Westminster, S.W.1. The application forms are returnable on December 19.

MRS. CHASTON CHAPMAN, being the sole legatee under the will of her husband, Dr. A. Chaston Chapman, has, owing to his sudden death, arranged for the staff at 8 Duke Street, who have been with him for many years, to carry on pending any new arrangement that may be made. Mrs. Chaston Chapman hopes that the trust her husband put in his assistants, Mr. C. W. McHugo, Mr. F. A. Hatch and other members of his staff, will be maintained by his clients.

THE IMPORT DUTIES ADVISORY COMMITTEE gives notice of applications for increase of duty on carbons (decolourising and activated) other than animal, and for the addition of crude iodine and copper iodide to the free list. Any representations which interested parties desire to make should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, London, S.W.1, not later than November 24, 1932.

THE ELECTROPLATERS' AND DEPOSITORS' TECHNICAL SOCIETY opened its eighth session in London with a discussion on the possibility of standardising electro-deposits. The standards committee of the society has been engaged for two or three years, on a revision of the nomenclature employed in electroplating and electro-chemical definitions, and on the formation of specifications for chemicals and materials used in the electro-plating industry. It is also considering the possibility of drawing up specifications for electro-deposits.

ALTHOUGH it was originally intended that the recently placed contracts for 5,000 tons of Universal steel plate, allocated to Dorman, Long and Co., of Middlesbrough, by the Russian Government, would be shipped by November 3, it is anticipated that it will not leave before the middle of November. It was stated that there will be a slight speed-up at the Redcar works, where the plates are being made, but there will be no increase of staff. It is almost certain that the Soviet will charter British vessels to carry the plate to Leningrad.

IT WAS SUGGESTED on November 1, at the research meeting of the Institution of Gas Engineers, that centralised plants for the manufacture of ammonia might be established. It was stated by the Ammonia Sub-Committee of the Institution that these plants would be supplied with either concentrated liquor or some easily and cheaply prepared ammonium salt, such as ammonium bicarbonate, by individual gas undertakings. The sub-committee is investigating processes for the manufacture of ammonium bicarbonate, which is a comparatively stable salt; and it is hoped that it will be possible to use it with advantage as a fertiliser.

A TECHNICAL MEETING unlike any hitherto held in the United States is planned by the International Acetylene Association as a feature of its annual convention to be held at Philadelphia, November 16-18. This unique session will be held in the main auditorium of the Penn Athletic Club, 18th Street and Rittenhouse Square, Philadelphia, where an industrial drama in three acts and five scenes will be presented, portraying vividly the technical and practical factors of plant rehabilitation in the industrial field under to-day's economic conditions. It has been said that this type of technical meeting has been used with important success in Soviet Russia as a part of the development of the Five Year Plan and in the support of other major industrial projects. A cast of leading scientific and engineering authorities will assure the technical soundness of the programme and its dramatisation will represent a unique experiment in the appeal of this type of exposition to the American industrial public. Professor Frank P. McKibben, president of the American Welding Society, will preside at this session.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Canada.—A newly established firm of manufacturers' agents at Vancouver are prepared to represent United Kingdom manufactuerrs of chemical lines of all kinds, on a commission, consignment or purchase, basis for the Provinces of Alberta and British Columbia. (Ref. No. 625.)

Canada.—A newly established agent at Winnipeg with considerable experience of the food trade, etc., is prepared to represent United Kingdom manufacturers of food products and druggists' sundries, on a commission or consignment basis, throughout Western Canada. (Ref. No. 629.)

Ceylon.—An indenting agent at Colombo wishes to undertake the representation, on commission, of United Kingdom manufacturers of cheap toilet and washing soap, and cheap toilet powder. (Ref. No. 631.)

Albania.—A firm established in Valona desires to obtain the representation of United Kingdom manufacturers of lubricating oils. (Ref. No. 638.)

Brazil.—With reference to the notice in THE CHEMICAL AGE, September 10, page 258, the Brazilian Embassy announces that the date for the reception of tenders for alcohol production plant has, by Decree No. 21,848, been postponed to December 31 next. Under the same Decree the Brazilian Government have made certain alterations to Decree No. 21,201, of March 24 last, and information regarding the alterations can be obtained from the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. (Ref. 28104/1932.)

New Companies Registered

Dorilda Laboratories, Ltd., 37 Water Street, Manchester. Registered October 28. Nominal capital, £1,000 in £1 shares. Chemists, manufacturers and suppliers of and dealers in gases, drugs, medicines, brushes, toilet requisites and preparations, perfumes, etc. Directors: E. E. Hall and R. G. Kennedy.

Essential Products and Chemicals, Ltd., 3 London Wall Buildings, London Wall, London, E.C.2. Registered October 26. Nominal capital £100 in £1 shares. Importers, exporters, refiners, and manufacturers and dealers in chemicals, chemical products, essential oils, gases, drugs, medicines, etc. Directors: H. J. Dobson, I. Sillitti, and G. B. Winsor.

Hapilax, Ltd. Registered October 28. Nominal capital £2,000 in 1,500 £1 ordinary shares and 1,000 10s. deferred shares. Chemists, druggists, drysalters, oil and colourmen, etc. A subscriber: E. J. Ashfield, 76 New Bond Street, London, W.1.

North Park Stain Works, Ltd., 57 Union Street, Kettering. Registered as a "private" company on October 31. Nominal capital £500 in £1 shares. Stain and polish manufacturers and dealers, formerly carried on by W. Cox, at Union Street, Kettering. Director: Mrs. A. M. Cox.

Reform (Thermal Insulation Engineers), Ltd. Registered October 13. Nominal capital £2,500 in £1 shares. Objects: To adopt an agreement with H. C. M. Duesberg, of 62/63, Basinghall Street, E.C., and to carry on the business of technical insulation engineers, makers of and dealers in systems of insulation, refrigeration, chemical processes, gas production, heat plants, oil heaters, oil cracking plants, sugar refining, paper making, underground steam and hot water distribution, waste heat boilers, flue gas casings, etc. Subscribers: H. J. Fellows, 13 Brampton Grove, Kenton, and A. J. Wildey.

Situsec, Ltd., 11 Queen Victoria Street, E.C.4. Registered October 13. Nominal capital £10,000 in £1 shares. Objects: To acquire the trade mark "Situsec" No. 492,601, and to carry on the business of manufacturers of and dealers in emulsive, adhesive, mastic, viscid, saponaceous, oleaginous and mucilaginous substances, analytical, research, consulting, pharmaceutical, manufacturing and general chemists and druggists, etc. Directors: Dr. H. A. H. Harris, Fay Gate, Chelmsford, and Flight Lt. W. M. M. Hurley, R.A.F.

The Leneuf Syndicate, Ltd., 95 Gresham Street, London, E.C.2. Registered as a "private" company on November 3. Nominal capital £5,000 in £1 shares. To acquire any invention relating to viscose; to carry on any manufacturing, chemical, research or other business. Director: A. Christie.

Tidewater Trading & Manufacturing Co., Ltd., Dumballs Road, Cardiff. Registered October 14. Nominal capital £400 in £1 shares. Objects: To adopt an agreement between Fletcher Miller, Ltd., Alma Mills, Dukinfield, Manchester, and F. J. Lovelace of 2 East Grove, Cardiff, and to carry on the business of oil refiners and blenders, soap, grease, tallow and candle manufacturers and dealers, paint and colour manufacturers, chemical manufacturers, chemists, druggists, etc. Directors: F. J. Lovelace, 2 East Grove, Cardiff, and Mrs. Elvera O. Lovelace.

New Chemical Trade Marks

Opposition to the registration of the following trade marks can be lodged up to November 19, 1932.

Homovir. 533,791. Class 3. Chemical substances, being gland extracts in tablet form, prepared for use in medicine and pharmacy. The Anglo-French Drug Co., Ltd., 11 and 12 Guilford Street, London, W.C.1; wholesale and manufacturing chemists. July 26, 1932.

Roche Tonikum. 532,790. Class 3. Chemical substances prepared for use in medicine and pharmacy, but not including medicated jujubes and pastiles or medicated bath salts, and not including any goods of a like kind to any of these excluded goods. The Hoffman-La Roche Chemical Works, Ltd., The "Roche" Laboratories, 51 Bowes Road, London, N.13; manufacturing chemists. June 21, 1932. (By Consent.)

Trosilin. 534,842. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Bayer Products, Ltd., 31 to 34 Basinghall Street, London, E.C.2; merchants and manufacturers. September 8, 1932.

Opposition to the Registration of the following trade marks can be lodged up to November 26, 1932.

Tinocine. 534,217. Class 1. Chemical substances used in the manufacture of insecticides. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester; manufacturers. August 13, 1932. (By consent.)

Beveno. 535,087. Class 3. Chemical substances prepared for use in medicine and pharmacy. Veno Drug Co., Ltd., Veno Buildings, Chester Road, Manchester, S.W.; manufacturers. September 21, 1932.

Detensyl. 535,183. Class 3. Chemical substances prepared for use in medicine and pharmacy. Alfonso Grilletto, 8 Avenue Walkanaer, Nice, France; manufacturer. September 23, 1932.

Capias. 534,911. Class 3. Chemical substances prepared for use in medicine and pharmacy, but not including antiseptic lotion for the scalp and not including any goods of a like kind to these excluded goods. Medicinal Remedies, Ltd., 80 King Street, Dudley, Worcestershire; chemical manufacturers. September 12, 1932.

Apicosan. 533,585. Class 3. Chemical substances prepared for use in medicine and pharmacy. August Wolff, Johannistal 48, Bielefeld, Germany; chemical manufacturer. July 19, 1932.

Preemo. 535,201. Class 4. Essences and essential oils, all for use in manufactures and not included in other classes. Lewis Silk, trading as The Preemo Co., 63 High Holborn, London, W.C.1; manufacturer of concentrated essences and essential oils. September 26, 1932.

Company News

Babcock & Wilcox, Ltd.—An interim dividend of 4½ per cent., less tax, on the ordinary shares, will be paid October 31. This compares with 7 per cent., less tax, a year ago.

Imperial Smelting Corporation, Ltd.—The net profits for the year to June 30 were £137,472, as compared with £113,581 in 1930-31. The preference dividend absorbs £134,538, leaving £17,338 to be carried forward.

Stanton Ironworks Co., Ltd.—An ordinary interim dividend of 4 per cent. has been declared, payable on December 10. The payment will be made less tax, whereas in previous years dividends have been free of tax.

Shell Union Oil Corporation.—A loss is reported for the third quarter of 1932 of $162,593, against a loss of $2,681,620 in the corresponding quarter of 1931. The result for the first three quarters of the current year is a loss of $3,098,020.

Explosives and Chemical Products Co.—The profit for the year to June 30, after allowing for depreciation, was £11,443, plus £19,191 brought in, making £30,634. After payment of the ordinary dividend of 16⅔ per cent., tax free, and the dividend on the deferred shares of 6.0717d. per share, tax free, there remains £20,461 to be carried forward.

Wall Paper Manufacturers, Ltd.—The gross profit for the year to August 31 last is £608,147, against £592,636 in the previous year. A final dividend of 5 per cent. is recommended on the ordinary shares, making the maximum 10 per cent. and the deferred again receive a final of 6 per cent., also making 10 per cent. Staff pension fund receives a further £10,000, while £100,000, against £75,000, is allocated in reduction of goodwill, patents, processes and trade marks, leaving £263,991, compared with £272,762, to go forward.

William Blythe & Co., Ltd.—It is reported that the directors have decided to adjust the proportions of preference and ordinary shares so as to make the two divisions approach more nearly to equal proportions. Under the scheme, each preference shareholder will be entitled to a dividend at the rate of 8 per cent. on his existing holding, while each ordinary shareholder will have two-fifths of his present holding converted into 8 per cent. cumulative preference shares, the remaining three-fifths continuing to be ordinary capital.

British Glues and Chemicals, Ltd.—The directors have decided to pay the fixed cumulative dividend of 4 per cent. (less tax) on the 8 per cent. cumulative participating preference shares for the half-year ended October 31, 1931.

Du Pont de Nemours Co.—The total income for the three months ended September 30, was $5,723,746, against $14,575,631 for the corresponding quarter of 1931. For the nine months to September 30 the total income was $20,450,644 (against $43,328,143) and consolidated earnings applicable to Common stock, $14,841,776 (against $36,830,458). Dividends absorbing $24,503,963 have been paid on the common stock for the nine months.

Anglo-French Phosphate Co.—The available balance for the year 1931, including £24,016 brought in, is £52,271. A dividend of 8 per cent. (unchanged) and a bonus of 5 per cent. (against nil) have been paid, leaving to be carried forward, £27,896.

Lawes' Chemical Manure Co., Ltd.—A full year's dividend is announced on the 7 per cent. non-cumulative participating preference shares at 10s. each. This is the first dividend to be paid since 1920, in which year 7½ per cent. was paid on the ordinary. The trading profit during the year to June 30 last amounted to £8,438, compared with £3,739 in the previous year, and the net profit to £3,316 (against £919).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

CEMENT INDUSTRIES, LTD., London, S.W. (M., 12/11/32.) Registered October 31, £14,000 debentures, part of £70,000; general charge.

CHESHIRE UNITED SALT CO., LTD., London, E.C. (M., 12/11/32.) Registered October 31, £5,000 debentures, part of £35,000 (not ex.); general charge (subject, &c.) *£9,025. October 23, 1931.

DURIUM PRODUCTS (GREAT BRITAIN), LTD., London, E.C., manufacturers of gramophone records. (M., 12/11/32.) Registered October 31, £1,000 debentures, part of £10,000 (not ex.); general charge.

LEVER BROTHERS, LTD., Port Sunlight, soap manufacturers. (M., 12/11/32.) Registered November 1, Trust Deed dated October 20, 1932, supplemental to Trust Deed dated April 29, 1932, securing £2,288,146 consolidated debenture stock part of £15,000,000 secured by principal Trust Deed; charged on property charged by principal Trust Deed; also registered November 1. £2,288,146 debenture stock. *£6,788,780 1st debenture stock (of which company has covenanted to redeem £3,440,000 on June 14, 1932) and £3,440,000 consolidated debenture stock. May 12, 1932.

Bill of Sale

MATCHET, ANDREW SNEDDON, Cefor, Weedon Road, Northampton, analytical chemist. (B.S., 12/11/32.) Dated November 2, filed November 5. £60.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

NEW PROCESS RUBBER CO., LTD., 27-29 Finsbury Court, E.C., manufacturers. (C.C., 12/11/32.) £15 3s. 10d. August 24

BURFORD, WALLIE ALLEN, 6 Moreton Road, Croydon, chemical engineer. (C.C., 12/11/32.) £33 9s. 1d. October 3.

London Gazette, &c.

Company Winding Up Voluntarily

PEPTINE MALTINE, LTD. (C.W.U.V. 12/11/32.) By special resolution October 28. Arthur Stanton Todd, of 3 Granby Street, Leicester, appointed liquidator.

"L & N" COAL DISTILLATION, LTD. (C.W.U.V. 12/11/32.) By reason of its liabilities, November 4. Mr. J. H. Senior, of Derbyshire & Co., appointed liquidator.

KINGSTON DRUG CO., LTD. (C.W.U.V. 12/11/32.) By special resolution October 27. Mr. Robert Martin Brodie, of 29 Scale Lane, Hull, Yorks, appointed liquidator.

Bankruptcy Information

WOOD, CYRIL CLAUDE, "Sharuben," Honiton Road, Exeter, acid manufacturer. First meeting November 15, 11.30 a.m. Official receiver's offices, Exeter Bank Chambers, Broadgate, Exeter. Public examination, December 14, 10.30 a.m. The Castle, Exeter.

Partnership Dissolved

"THE ROSKO RUBBER CEMENT & CHEMICAL CO." or "ROS-KO" RUBBER CEMENT & CHEMICAL CO. (Josiah Asher, Walter Joseph Papworth and Arthur Papworth), cement and chemical manufacturers, at Aylestone Road, Leicester, by mutual consent. July 1, 1932. Debts received and paid by Arthur Papworth.

Forthcoming Events

Nov. 14.—Ceramic Society. "Natural Light—Artificial Illuminations for Matching Colour." Dr. P. W. Cunliffe. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Nov. 14.—Institute of Metals (Scottish Section). "The Production of Hot Brass Pressings." J. W. N. Beard. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Nov. 14.—Institution of the Rubber Industry (London Section). "The Use of Rubber in the Printing Industry." G. L. Riddell. First Avenue Hotel, High Holborn, London.

Nov. 14.—University of Birmingham Chemical Society. "Some Aspects of Stereochemistry." Dr. W. H. Mills. 5.30 p.m. University, Edgbaston, Birmingham.

Nov. 14.—Institute of Chemistry (Leeds Area Section). Annual General Meeting. "The Variation of Germicidal Action in Homologous Series." Dr. F. L. Pyman. 7.15 p.m. Great Northern Hotel, Leeds.

Nov. 15.—Institution of the Rubber Industry (Scottish Section). "Rubber Compounding Ingredients; their Whys and Wherefores." J. R. MacF. Duncan. 25 Charlotte Square, Edinburgh.

Nov. 15.—Hull Chemical and Engineering Society. "Tryptic Enzymes." C. E. Pickard. 7.45 p.m. Grey Street, Park Street, Hull.

Nov .16.—Society of Glass Technology. 10 a.m. At the works of Alfred Herbert, Ltd., Coventry.

Nov. 16.—Electroplaters' and Depositors' Technical Society. "Living Organisms in Plating Solutions." E. A. Ollard. Annual Meeting. 8.15 p.m. Northampton Polytechnic Institute, Clerkenwell, London.

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